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# THE QUARTERLY BULLETIN

## OF THE

# STATE PLANT BOARD

## OF MISSISSIPPI

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PUBLISHED BY

STATE PLANT BOARD OF MISSISSIPPI

AGRICULTURAL COLLEGE, MISSISSIPPI

Application for entry as second-class matter at the postoffice at Agricultural College, Mississippi, pending.

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# QUARTERLY BULLETIN

## SUMMARY OF STATE PLANT BOARD WORK PREVIOUS TO 1921

### CLAY LYLE

The State Plant Board of Mississippi was created by the "Mississippi Plant Act of 1918" and began operations in May, 1918. From the beginning the purpose of the Plant Board has been the protection of the agricultural interests of Mississippi from injurious insects and plant diseases by preventing the introduction of new pests and attempting wherever practical to eradicate those already within the State. The first biennial appropriation allowed \$25,000 a year, but due to a stenographical error in writing the bill only \$25,000 was made available for the Plant Board for the biennial period. On this limited appropriation work was carried on as extensively as possible but only through the co-operation of the United States Bureau of Plant Industry and Bureau of Entomology was the Plant Board enabled to combat successfully Citrus Canker and to achieve favorable progress in eradicating the Sweet Potato Weevil.

The alarming aspect of the pink bollworm situation in the winter of 1919-20 resulted in a greatly increased appropriation for the Plant Board for the next biennial period which permitted a much-needed increase in the working force, and during 1920 commendable progress was made in all lines of work. A more permanent staff of inspectors has been obtained since the war and increased efficiency has resulted. A brief summary is given below of the work accomplished in each line of activity from the organization of the Board until the beginning of the present year.

### PINK BOLLWORM SCOUTING AND QUARANTINE.

Apparently the pink bollworm has not yet reached Mississippi as extensive scouting over the State has not revealed its presence. Lack of funds prevented very much scouting for this pest until the summer of 1920 when a number of inspectors were sent over the State in small automobile parties. This work was continued systematically throughout the year, some work being done in every county in the State except one. In addition to the scouting work, a strict quarantine has been maintained against seed cotton, cotton seed, and cotton seed hulls from Texas and Western Louisiana. These products, coming from all other sections except Texas and Western Louisiana, can enter Mississippi only on permits from the Chief Inspector of the State Plant Board, the permits being issued only after the exact point of origin has been established by affidavit. As a result of the extensive scouting and the maintenance of a strict quarantine, the Plant Board is rather optimistic regarding the pink bollworm situation, provided the State of Texas passes the necessary legislation to carry on the proper eradication work.

A summary of the pink bollworm scouting and inspection work prior to April 1, 1921, compiled by Chief Inspector, Hunter H. Kimball, is given below:

Man-hours.....	5,447
Acres of Cotton.....	124,343
Inspections made.....	1,579

Properties inspected .....	1,447
Gins inspected .....	91
Seed Houses inspected .....	17
Oil Mills inspected .....	2
Inspected properties using home-grown seed .....	850
Inspected properties using locally grown seed .....	293
Inspected properties using out-state seed .....	139
Inspected properties using seed, origin unknown .....	165

### CITRUS CANCKER ERADICATION.

The eradication of citrus canker was undertaken by the Federal Bureau of Plant Industry before the State Plant Board of Mississippi was organized and all of the early work was supported largely by Federal funds. The establishment of the Plant Board in 1918 enabled Mississippi to bear part of the expense. In 1916 this disease was spreading like wildfire over the southern part of the State, but by careful, conscientious, and hard work on the part of a large force of inspectors, this serious disease has apparently been completely eradicated from the State, as not a single infected plant was found in 1920. The reduction in the number of infected properties is shown graphically below:

#### Mississippi Properties Infected with Citrus Canker.

##### YEAR

1916 [REDACTED] 108 Properties

1917 [REDACTED] 47

1918 [REDACTED] 14

1919 [REDACTED] 4

1920—NONE

1921—NONE

Total number of grove trees found infected to Dec. 31, 1920... 3,081

Total number of nursery trees found infected to Dec. 31, 1920..... 51,167

Total number of citrus trees burned to Dec. 31, 1920, including  
infected trees and those burned as precautionary measure . 110,635

Mississippi is now believed to be entirely free from this most serious disease of citrus trees, but careful inspection of citrus groves and nurseries will be continued lest an unknown isolated infection should become scattered. A strict quarantine is also maintained which positively prohibits the importation of any citrus stock into Mississippi, except rare varieties which may be admitted under a special permit. With this assurance of protection the citrus industry in South Mississippi should grow rapidly and greatly add to the revenue of that section.

### ARGENTINE ANT CONTROL.

In controlling the Argentine Ant the State Plant Board has made good progress. No other state has taken up this work in such a systematic manner as Mississippi. This pest is known to be present in at least

24 towns in the State and has done a great deal of damage. During 1920 eradication campaigns were put on in four towns with excellent success in some and favorable reports from others. In these campaigns the towns furnish the money to pay for the materials and the Plant Board supplies men to mix the poison and direct the work, being fortunate enough the past season to secure the services of Mr. E. R. Barber, of the Federal Bureau of Entomology, author of Farmers' Bulletin No. 1101 on this subject. Considerable delay was experienced during 1920 in obtaining the necessary materials but to guard against a recurrence, the Plant Board has arranged to keep supplies on hand and during 1921 will be ready to co-operate immediately when a town desires a control campaign.

### MOSAIC DISEASE OF SUGAR CANE.

In the eradication of Mosaic Disease the Plant Board has made as good progress as could be expected. This disease was reported at only one point in Mississippi in 1919, by an inspector of the Federal Bureau of Plant Industry in a very hurried and incomplete survey of the Gulf Coastal region, but further investigations during 1920 by Dr. L. E. Miles, Plant Pathologist of the State Plant Board, indicated that the disease had been present in several counties of the State for a number of years. Work on this disease was not started until July, 1920, but during the fall 276 properties, located in 40 counties and comprising a total of 294½ acres of sugar cane were inspected, either by the Plant Pathologist, or by Plant Board inspectors. Of this number, 34 properties located in 14 different counties, were found to be infected with mosaic disease. During 1921 a much more extensive survey of the State will be made and in all probability other counties will be added to the list now known to contain infected properties.

To prevent the further introduction of this disease, the State Plant Board has passed quarantine regulations prohibiting the importation of sugar cane, for any purpose whatsoever, into Mississippi from any other state, except on a special permit to be granted by the Plant Board, when it is assured by the proper authorities that the cane in question is free from the disease and is from a region in which the disease is not known to occur. It has also passed regulations forbidding the shipment of sugar cane from the infected counties in Mississippi to any other counties where the disease is at present unknown.

Infected properties have been reported in the counties named below:

Covington	Jackson	Marion	Stone
George	Kemper	Pearl River	Walthail
Green	Lamar	Pike	Wayne
Harrison	Lauderdale		

The map on the next page shows the location of the known infections in Mississippi in 1920. Mississippi Agricultural Experiment Station Bulletin No. 191, "The Mosaic Disease of Sugar Cane in Mississippi in 1920," by L. E. Miles, Plant Pathologist of the State Plant Board, is for free distribution and should be read by all farmers who suspect the presence of mosaic disease in their cane.

QUARTERLY BULLETIN FOR APRIL, 1921

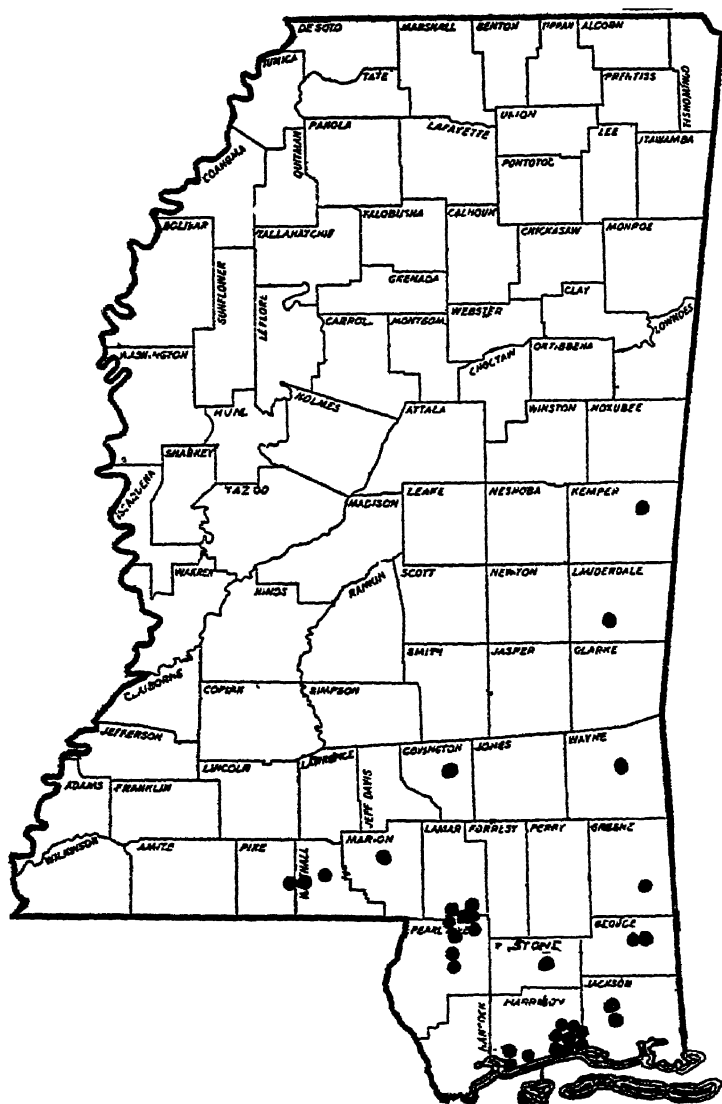


FIG. 2. MAP OF MISSISSIPPI SHOWING LOCATION OF PROPERTIES INFECTED WITH MOSAIC DISEASE OF SUGAR CANE IN 1920.

### QUARANTINE DEPARTMENT.

The quarantine service of the State Plant Board reached a greater efficiency during the first quarter of the present year than at any previous time. Prior to 1921, quarantine inspectors had been maintained at Meridian, Jackson, Vicksburg, Natchez, and Gulfport, but on February 1, of the present year, additional inspectors were stationed at Corinth, Columbus, Lucedale, McComb, Hattiesburg, Centreville, Tunica, Tupelo, Hernando, Greenville, Greenwood, New Albany, and Holly Springs. Many of these towns will not remain permanent points of inspection as the men will be shifted to other places as the needs require.

The flexibility of the quarantine department will permit inspectors to be used in scouting for pests and other field work during periods when few plant shipments are moving, returning again to their stations during seasons of heavy shipments such as the movement of nursery stock in the fall and of cotton seed and potato plants in the spring. These inspectors are enforcing quarantines against the following insect pests and plant diseases:

Alfalfa Weevil	Sweet Potato Weevil	Mosaic Disease of Sugar
Pink Bollworm	Gypsy Moth	Cane
European Corn Borer	Brown-tail Moth	Citrus Canker
Mexican Bean Beetle	Japanese Beetle	Black Rot and Stem Rot of sweet potatoes.

Besides these plant pests, the State Plant Board is charged with the control and eradication of American and European foulbrood of bees, and it is the duty of the inspectors to enforce a quarantine against these diseases.

In addition to the port and railway inspection, the State Plant Board instituted the inspection of parcel post shipments in October, 1920, when Agricultural College and Ocean Springs were made terminal inspection points under the Federal Postal Laws and Regulations. Results obtained at these points showed the value of this work and in March, 1921, Gulfport, Jackson, and Holly Springs were added to the list of terminal inspection points.

### NURSERY INSPECTION DEPARTMENT.

The Mississippi Legislature in 1908 passed the first nursery inspection law which was very inadequate as no money was appropriated for its enforcement. In this unsatisfactory manner the nursery inspection work was carried along until the State Plant Board was organized in 1918, nurseries in other states using Mississippi as a "dumping ground" for inferior and diseased trees which could not be sold in states with efficient nursery inspection laws. Real nursery inspection under the Plant Board Regulations began July 1, 1918, with George F. Arnold as first Nursery Inspector, which position he held until he resigned in October, 1919, and was succeeded by D. W. Grimes, the present Nursery Inspector.

The following figures give briefly the totals of the different kinds of nursery stock inspected in Mississippi each year; also the number of nurseries and the total acreage:



	YEAR		
	1918	1919	1920
Number of nurseries inspected.....	71	92	123
Acreage in nurseries inspected.....	348	317	402
Amounts of various nursery stock:			
Grafted and budded pecans.....	291,000	203,555	394,315
Seedling pecans.....	537,800	622,870	679,546
Total pecans.....	828,800	826,425	1,073,861
Citrus trifoliata.....	521,526	570,540	193,470
Orange.....	58,870	73,758	112,269
Grapefruit.....	1,657	1,345	465
Miscellaneous citrus stock.....	377	358	-----
Total citrus stock.....	582,430	646,001	306,204
Apples.....	19,775	16,025	33,087
Peaches.....	17,040	10,065	31,587
Pears.....	15,000	8,125	13,870
Japanese Persimmons.....	8,750	1,925	1,307
Strawberries.....	2,500	3,125	135,000
Grapes.....	1,240	1,500	5,800
Mulberry.....	1,180	880	1,400
Miscellaneous fruit stock.....	103	1,453	7,245
Total fruit stock (citrus excluded).....	65,588	43,098	229,296
Roses.....	446,572	382,000	331,495
Miscellaneous Ornamentals.....	393,788	281,795	560,880
Total Ornamental Stock.....	840,360	663,795	892,375

Grand Total of Plants inspected 2,317,178 2,179,319 2,501,736

### SWEET POTATO WEEVIL ERADICATION.

For several years the sweet potato weevil has been present on a number of farms in Harrison, Hancock, and Jackson Counties, and the lower part of Pearl River County. In the fall of 1919 an arrangement was perfected between the State Plant Board and the Federal Bureau of Entomology for conducting an eradication campaign against this pest in the counties just named. Thorough scouting revealed its presence on 210 properties and through the co-operation of the owners of these properties encouraging progress toward eradication has been achieved. The Plant Board and the Bureau of Entomology agreed to furnish free potato plants to the owners of the infested farms who agreed on their part to follow certain control and clean-up measures advised by the Plant Board. Under this system the State furnished 1,364,300 plants to owners of infested farms in 1920. As a result 27 farms that received 223,750 free plants in 1920 have this year been declared free of the weevil and no plants will be required for them.

Believing that it would lessen the danger of giving diseased plants to the farms and that it would be less expensive also, the Plant Board has this year (1921) grown its own plants instead of buying them. Twelve hundred bushels of selected seed were bedded at Wiggins in Stone County, which amount has furnished plenty of plants to supply the demand as only 1,349,200 plants were requested for this season. With the favorable results already accomplished it is likely that this plan will be followed until the pest is completely eradicated.

### POTATO INSPECTION DEPARTMENT.

Realizing the losses suffered by sweet potato growers on account of black rot and stem rot, and feeling the necessity of having one man directly in charge of the co-operative work with the Federal Bureau of Entomology in eradicating the sweet potato weevil, the Plant Board added the Potato Inspection Department in August, 1920, with J. C. Holton in charge, who immediately began to formulate rules to prevent the further spread of potato diseases and to make it possible for farmers with uninfected land to get healthy, disease-free potato seed. These rules were passed by the Plant Board in December, 1920, among them one prohibiting the movement or shipment into or within Mississippi of seed sweet potatoes or sweet potato plants that had not been officially inspected and found free from disease. Certificate tags were issued to potato growers whose seed and plants passed inspection, one tag being required on every parcel or package of plants or tubers.

In spite of all the publicity that could be given to this regulation, many growers still knew nothing of it when the potato plant season opened this spring and consequently many diseased shipments were intercepted and returned or destroyed. A widespread campaign to acquaint the public with this regulation and its importance will be attempted during the coming fall and winter through the medium of fairs, schools, papers, posters, and other agencies. It is hoped that this publicity will lessen the difficulty in strictly enforcing this rule next season.

### EDUCATIONAL DEPARTMENT.

Realizing the necessity of disseminating information about the State Plant Board Regulations and all phases of Plant Board work, an inspector was added to the force on December 1, 1920, to take charge of all educational and editorial work. He has the supervision of everything published by the Plant Board, including the Quarterly Bulletin, other bulletins, circulars, posters, and newspaper articles. He will also have charge of the Plant Board exhibits at the various fairs over the State and will make all preliminary arrangements such as preparing exhibits, reserving space, routing exhibits, and securing inspectors to take charge of the exhibits at different places.

This inspector will also visit schools over the State giving illustrated lectures showing the pests which the Plant Board is trying to keep out of Mississippi, such as the pink bollworm, the Mexican bean beetle, European corn borer, alfalfa weevil, and many others. At these lectures, he

will explain the various lines of Plant Board work and will ask the co-operation of the people in carrying out the Plant Board Regulations. Whenever desired, this inspector will also give information and advice about controlling the common insect pests and plant diseases of the farm, garden, and orchard.

The inspector in charge of educational work will also assist in any other department where his services may be needed, as in nursery inspection, potato inspection, or quarantine service.

## HELP KEEP SUGAR CANE PESTS OUT OF MISSISSIPPI

R. W. HARNED

In connection with the rapidly growing syrup industry in South Mississippi it is important to note that careful investigations have shown this State to be comparatively free of serious sugar cane pests. A light infestation of the sugar cane moth borer in the southwestern corner of the State, near Woodville, is thus far the only important sugar cane insect known in Mississippi. All other important sugar cane growing sections of the world, such as the West Indies, Mexico, Central and South America, Hawaii, India and Java have serious pests that are still unknown in Mississippi. Even Louisiana sugar cane growers have several very serious insect pests to contend with which are not yet present in this State. The Mississippi State Plant Board is asking the co-operation of all cane growers in the State in order to keep these pests out of Mississippi indefinitely.

No sugar cane should be brought into Mississippi if it can possibly be avoided as there is always danger of bringing in new pests from other states and countries. A few stalks of cane may look entirely harmless and there are many people who might bring a few stalks into the State without giving a thought to the fact that they may be bringing in some pest that will cost the State many thousands, if not millions, of dollars in the future.

The sugar cane moth borer and the sugar cane mealy bug are the two worst insect pests of sugar cane in Louisiana. They also occur in parts of Florida and Texas and in many other parts of the world. To prevent the introduction of these insects and the mosaic disease, the State Plant Board of Mississippi prohibits the shipment of sugar cane into Mississippi except when accompanied by a permit from the Plant Board. Quarantine inspectors of the State Plant Board are constantly on watch to prevent any sugar cane coming into Mississippi except on permit, but any person noticing shipments of cane entering the State, or any damage to sugar cane by insects, should immediately notify the Entomologist, Agricultural College, Mississippi.

## PARCEL POST INSPECTION VALUABLE

GEORGE F. ARNOLD

That the Parcel Post Inspection of plants and plant products instituted by the State Plant Board in October, 1920, is a valuable service to the State is shown by the fact that 16 per cent of all shipments inspected have been found infested with injurious insects or infected with plant diseases.

Minor complaints have been made against the inspection work on account of short delays in delivery, which are unavoidable, even though parcels are inspected and forwarded in the next mail, as is the usual case but the value of the inspection service has been so clearly proven that it is certain that it will be continued as a permanent part of the State Plant Board work.

Under the Federal Postal Laws and Regulations, Mississippi postmasters are required to forward all parcels entering the State containing cuttings, flowers, fruit, leaves, nuts, cotton seed and other seed (except vegetable and flower seeds), plants (except cabbage, tomato, egg plant, and pepper plants), trees, vegetables, and vines to Agricultural College, Jackson, Holly Springs, Gulfport, or Ocean Springs, Miss., for inspection, except when these parcels are accompanied by a Federal Horticultural Board certificate. No other certificate is recognized.

Parcels containing the following articles mailed in Mississippi for delivery at Mississippi postoffices must be accompanied by certificates from the State Plant Board or the Federal Horticultural Board: banana plants, citrus flowers or leaves, shrubs or cuttings thereof, strawberry plants, sweet potatoes, sweet potato vines or draws, trees or cuttings thereof, vines of a woody nature or cuttings thereof.

All parcels containing the above materials and addressed to a point in a state where parcel post inspection is maintained, must be plainly marked to show the contents and failure to do so renders the party mailing the parcel liable to a fine of \$100 under the Federal Postal Laws.

The importance of these regulations will be readily seen by those who realize the danger of introducing insect pests and plant diseases into the State through the unrestricted use of the mails. Anyone desiring further information about the Parcel Post Inspection Service in Mississippi should write the State Plant Board, Agricultural College, Mississippi.

## MISSISSIPPI PUTS BAN ON SCRUB FRUIT TREES

CLAY LYLE

That scrub fruit trees have no more right in Mississippi than scrub cows or hogs is the opinion D. W. Grimes, State Nursery Inspector, expressed in a recent letter to all Mississippi nurserymen, warning them that no certificate tags will be issued during the coming season to nurseries that are overrun with weeds and producing stunted, low-grade plants. The nurserymen are being notified now in order to give them plenty of time to cultivate and clean up their nurseries and have their trees in thrifty growing condition before the regular summer inspections are made.

Heretofore, in Mississippi as well as in many other states, practically all the nursery inspection work has been devoted to examination for insect pests and diseases, but henceforth the Nursery Inspection Department will require in addition to freedom from insect pests and diseases, that nursery stock must be in thrifty, vigorous condition before certificate tags will be issued. Most Mississippi nurseries are already meeting these requirements but this latest ruling of the Nursery Inspector will place them all on the same basis.

To prevent this rule from discriminating against Mississippi nurserymen, the State Plant Board will require nurseries in other states shipping into Mississippi to furnish information from the state nursery inspection officials showing that their trees are thrifty and vigorous before permit certificate tags will be issued. This ruling should greatly improve the quality of the nursery stock shipped into Mississippi, as well as that produced in the State.

## CAMPAIGN FOR HEALTHY SEED POTATOES

**Mississippi Farmers Should Plant Vine Cuttings Now.**

**J. C. HOLTON**

In an effort to stop the tremendous loss to sweet potato growers resulting every year from black rot, and stem rot, the State Plant Board is urging all farmers to grow healthy sweet potato seed for next year by planting vine cuttings now in land that has never been in potatoes before. Experiments have shown that this is positively the very best way of growing sweet potato seed and if carefully done will produce seed free from disease. Cuttings should be made only from healthy vines as the fungus causing stem rot often goes down a vine for several feet. Then it is very necessary that these healthy cuttings be set out in ground that has never grown potatoes before, as the disease spores present in old potato fields would readily infect the healthy cuttings.

All growers of seed sweet potatoes for market should heed this advice especially, since a regulation of the Plant Board makes it unlawful to ship or sell seed potatoes that have not been inspected and found free from disease. This regulation will be strictly enforced next year and prompt legal action taken against violators.

In putting on this campaign the State Plant Board has asked the co-operation of all the county agents of Mississippi, the extension force of the A. & M. College, the State Department of Agriculture, the Mississippi Experiment Stations, the county agricultural high schools, the potato storage houses of the State, some prominent farm papers, and all county and state papers. It is hoped that a great decrease in the quantity of diseased plants will be found next season as a result of this united effort for healthy seed.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI.

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers and other publications of a similar nature.

R. W. HARNED, *Entomologist*.....EDITOR  
 HUNTER H. KIMBALL.....ASSOCIATE EDITOR  
 CLAY LYLE.....MANAGING EDITOR

Application for entry as second-class matter at the Postoffice at Agricultural College, Mississippi, pending.

THE QUARTERLY BULLETIN. This publication is presented as a medium for expressing to the people of Mississippi the work and aims of the State Plant Board, to better disseminate information regarding plant diseases and insect pests affecting the farmers and fruit growers of the State, and to more effectively secure co-operation in enforcing the Rules and Regulations formulated by the Board for the protection of the agricultural and horticultural interests of the State.

This Bulletin, we frankly admit, will be modeled along the same lines as older publications serving a similar purpose in other states, especially "*The Quarterly Bulletin*" of the State Plant Board of Florida, and "*The Monthly Bulletin*" of the California State Department of Agriculture, both of which are rendering valuable service to the people of their respective states and are known in all parts of the world for their scientific articles on various horticultural and agricultural topics. We expect to get many valuable suggestions from these excellent publications.

Briefly, the purpose of the Bulletin is to give the farmers of Mississippi timely articles on insect pests and plant diseases, to acquaint them with the Rules and Regulations of the Plant Board, to ask for their co-operation in scouting for new insects and diseases, and to keep them well-informed about the current activities of the Plant Board.

**A Brief for Mississippi Cotton Seed.**—During the past season the State Plant Board issued permits for the shipment of 24,949 bushels of cotton seed into the State for planting purposes. Dr. H. B. Brown, Plant Breeder for the Mississippi Agricultural Experiment Station, commenting on this fact in Station Circular No. 37, states that these seed costing from \$2.00 to \$6.00 a bushel, plus heavy freight or express charges from eastern states, could have been easily purchased in Mississippi for half the cost. Figures are then given from experiments carried on in 1920 showing conclusively that Mississippi-grown cotton seed produced more cotton per acre in every case than similar strains from other states. This circular is for free distribution and should be read by all Mississippi farmers.

But from the viewpoint of the State Plant Board there is also another reason for using not only Mississippi-grown cotton seed, but also Mississippi seed corn, Mississippi sweet potato seed and draws, cowpeas, peanuts, sugar cane, and nursery stock, because with every shipment of these articles entering the State there is the possibility of bringing in one or more of the destructive insect pests and plant diseases occurring in many parts of the United States. Therefore, our farmers should seriously consider this reason as well as the others mentioned before purchasing seeds or plants in other states when equally as good or better seeds can be obtained in Mississippi.

**Notice.**—As the usual issue of the Quarterly Bulletin will consist of only 5,000 copies it is obvious that it cannot be sent to every citizen of the State or indiscriminately to a large mailing list. So if you are interested in keeping up with the work which the State Plant Board is doing and want to receive the Bulletin regularly, just drop a postal card to the Managing Editor, Agricultural College, Mississippi, and ask that your name be placed on the mailing list.

# THE MEXICAN BEAN BEETLE

## A SERIOUS PEST THREATENING MISSISSIPPI.

CLAY LYLE

Just at the time when Mississippi farmers are beginning to get on their feet again after the onslaught of the boll weevil, two other pests, equally if not more destructive than the weevil, threaten the State on both sides. On the west in Louisiana and Texas, the pink bollworm, already known as a far more injurious pest than the boll weevil, is menacing the cotton industry in Mississippi, but quarantine and eradication measures by the states and the Federal Horticultural Board of the United States Department of Agriculture give promise that this pest may ultimately be eradicated. An effective pink bollworm quarantine by the State Plant Board of Mississippi gives a feeling of security against this pest.

But on the east in Alabama, the Mexican bean beetle presents a more difficult problem since it is already established over a large area and its spread into Mississippi is regarded as almost inevitable.

MEXICAN BEAN BEETLE QUARANTINE LINE

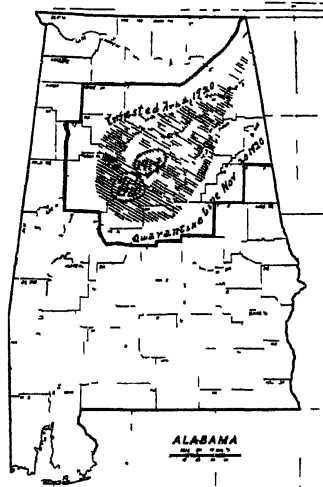


Fig. 1. Infested and quarantined area. (W. E. Hinds).

### Bean Beetle History

The Mexican bean beetle undoubtedly came from Mexico where it is widely distributed. It has been known in the semi-arid Southwest for many years and has done considerable damage to commercial bean crops in New Mexico and Colorado. As this section has been separated from the rest of the country by rough, and in most cases, untillable stretches



of land, the beetle has until recently been effectively confined to this area.

During the summer of 1920, specimens of a destructive bean pest sent to the Alabama State Entomologist gave first notice of the presence of the bean beetle in Alabama. Subsequent investigations by the Entomologists of the Alabama Experiment Station revealed the presence of this beetle in thirteen counties, stretching from the eastern part of Tuscaloosa County northeasterly to the Georgia line and covering a total area not less than 4,500 square miles. (See map, Fig. 1.) These investigations showed that the insect had been present in Alabama in 1919 and possibly in 1918, presumably entering in shipments of alfalfa hay from its western home.

### Description.

The Mexican bean beetle is about one-fourth inch long, a yellowish-brown color with eight black spots on each wing cover arranged in three rows across the back. The adults can fly. The yellow eggs are laid in groups of half a dozen to 75, averaging 40 or 50, on the under side of the leaves. A female has been known to produce as many as 1,500 eggs. The larva is bright yellow, slightly longer than the adult beetle, and covered by stout, black-tipped, branched spines. The pupa is found attached to leaves and pods. The complete life cycle from egg to adult requires three to four weeks. Cooler climates require longer periods. The beetle passes the winter in the adult stage under leaves, trash, bark of trees, or any place to escape exposure to the weather.

### Probable Damage in South.

In the semi-arid Southwest, at high altitudes and in some instances surviving a winter temperature 30 degrees below zero, and producing only two generations a year, this beetle has almost destroyed the bean-growing industry in many sections. Under the more favorable conditions here in the South, with our milder, more humid climate and an abundance of food during a long growing season, it is certain that we shall have three, four, or perhaps more generations of beetles a year, indicating that the serious damage in the Southwest may be multiplied many time here. In its native home this beetle confined its attacks chiefly to beans but already in Alabama it has proven very destructive to cowpeas and may develop a fondness for other food plants. Thus far it has caused little if any injury to velvet beans and peanuts and so long as its favorite food plants are present these others may escape attack.

Dr. W. E. Hinds, Entomologist of the Alabama Experiment Station, in a recent bulletin makes the following statement regarding the damage done by the pest:\*

"From the reports of Alabama bean growers who have now had experience with this pest for one or two years, from the consideration of changes in food and breeding habits, and from a study of the character

\*Hinds, W. E., 1921. The Mexican Bean Beetle, Ala. Agri. Exp. Sta. Bul. 216, p. 14.

and value of the food plants in this State, we may form some estimate as to the future prospects for damage. First, the destruction of kidney bean crops (snap and shell beans) has commonly been complete after about the first of July. Only a part of the early spring crop has been secured and the late planting of beans has proven useless. One truck farmer who saw the first of these insects in 1919 reports that he lost \$1,000 worth of beans in that season and fully \$1,800 worth in 1920. He has produced practically no beans since the insects became established in 1919 and will not attempt to grow beans in the future until effective control methods have been found. Another truck farmer had none of the bean beetles in 1919 and made an excellent late fall crop. In 1920 he planted no early crop but about August first planted two acres of late snap beans. The first beetles coming from neighboring gardens into which they had spread during July, 1920, were noticed in the two-acre field about the middle of August. By the first of September the plants were so completely destroyed that not a bean matured and the entire area was plowed up and replanted to other crops (Plate II, fig. 1). Lima or "butter" beans are usually less completely destroyed and a partial crop may be secured but destruction has been complete in many cases (Plate II, fig. 4). Pole and "cornfield" beans have been completely destroyed as a rule. Apparently the loss in our table bean crops may exceed 70 per cent.

"Second, crops of cowpeas and soybeans, while usually less severely injured thus far, have in some cases been riddled about as completely as the table beans. The reduction in yield of cowpea hay has been as high as one-third of its normal weight and the loss in feeding value would be an even greater proportion. As the bean beetles become more thoroughly established the damage to the important forage crops, cowpeas and soybeans, is likely to be far greater than has yet been seen."

As this pest attacks our principal leguminous forage crops, which are also our chief crops for restoring and maintaining soil fertility, the far-reaching and manifold losses resulting from its spread over the South will be a calamity of great magnitude. Indeed, as Dr. Hinds says:\*

"Those who have studied the situation most closely seem agreed that the entire agricultural system of the United States, in food and forage products and in the renewal of soil fertility, has never been so seriously menaced by any native or introduced insect pest as it is now by the spread of the Mexican bean beetle."

\*Hinds, W. E., 1921. The Mexican Bean Beetle, Ala. Agri. Exp. Sta. Bul. 216, p. 15.

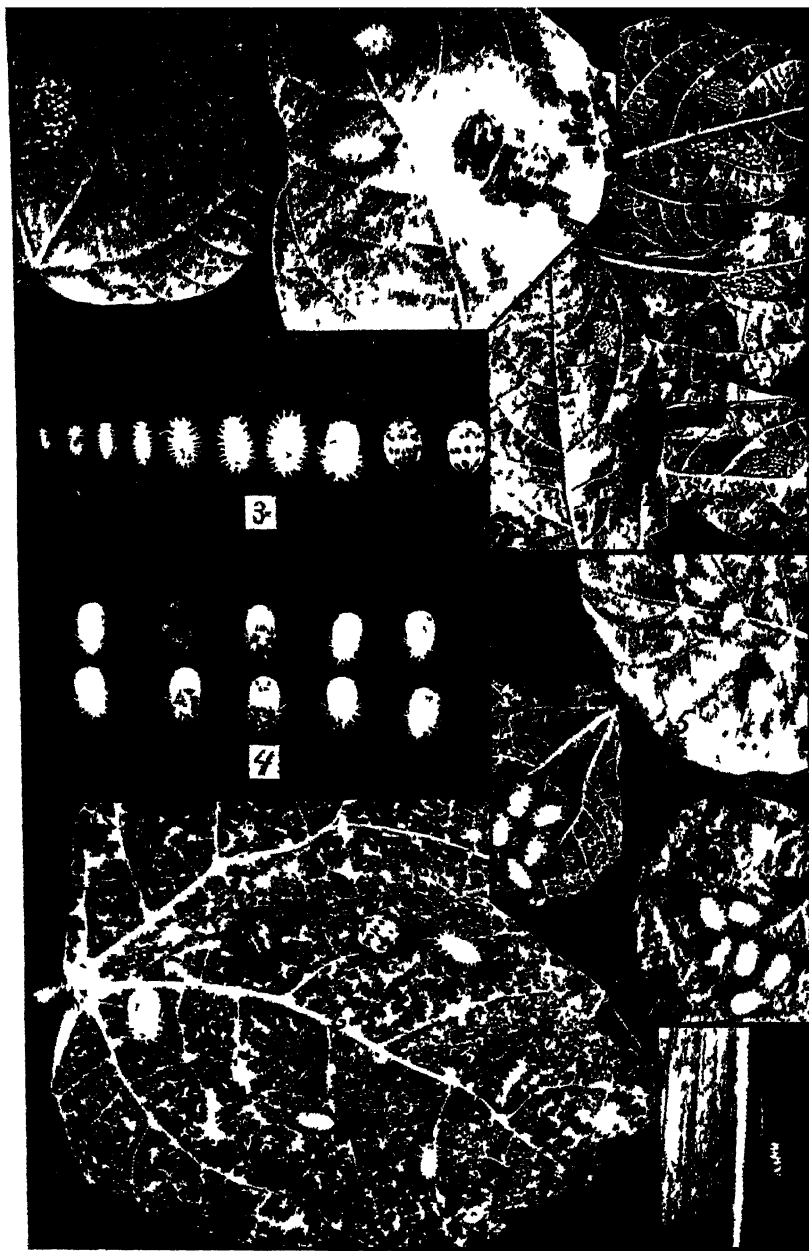


PLATE I. MEXICAN BEAN BEETLE STAGES—NATURAL SIZE  
 Fig 1, Four Stages on under side of bean leaves, fig. 2, five egg groups; fig 3, development and transformation after hatching; fig. 4, group of pupae (the transformation stage); fig. 5, pupation occurring on bean and morning glory leaves; fig. 6, stages and work on under side of bean leaf; fig 7, eggs (side view) deposited on corn leaf. All natural size. (Courtesy W. E. Hinds, Ala. Exp. Station)



**PLATE II. MEXICAN BEAN BEETLE INJURIES**

Fig. 1, Two-acre field of late snap beans 100% destroyed; fig. 2, typical plant from field above; fig. 3, skeletonized leaf showing characteristic feeding work; fig. 4, lima bean row completely defoliated—4000 adults collected from the section shown. (Courtesy W. E. Hinds, Ala. Exp. Station.)

### **Control Measures Unsatisfactory.**

The adult bean beetle is practically free from natural enemies, as birds and poultry generally refuse to eat them on account of a disagreeable, repellent fluid exuding from glands in their knee joints.

Even if this pest could be controlled by arsenical sprays, the problem would still be a serious one, for considering the low price usually obtained for cowpeas and soybeans there would be very little left after deducting the cost of spraying or in the case of hay the cost of spraying would be prohibitive to say nothing of the danger in feeding the spray-covered forage to animals. But spraying will not control the beetle as the adults are repelled by arsenicals and hunt unsprayed foliage, while the larvae feed on the under sides of leaves, skeletonizing them but leaving the transparent upper membrane of the leaf entire as a protection from hot sunshine, birds, or poison sprays. Even when the upper surface of the leaves has been heavily coated with lead arsenate the larvae have continued feeding and completely riddled the leaves. In addition to the ineffectiveness of stomach poisons the tender foliage of beans makes it impossible to use contact insecticides strong enough to kill the beetles, so that no satisfactory control spray has yet been found.

Dr. W. E. Hinds, Entomologist of the Alabama Experiment Station, is of the opinion that the beetle can be most effectively checked by the following methods: first, the prevention of late fall breeding by deep plowing and turning under their food crops early in the fall; second, the destruction of their hibernating places by cleaning up the fields thoroughly and removing all trash in which the beetles might pass the winter. Such a clean-up program is expected to reduce the damage considerably.

### **Expected Spread of Beetle.**

This insect is a very capable flyer and its spread by this method is certain. Hinds, of the Alabama Experiment Station, estimates the probable spread of the beetle by flying as 30 miles a year. At this rate, if unchecked, the beetle will probably be found in Mississippi in the eastern part of Monroe, Lowndes, and Noxubee Counties during the summer of 1923, or perhaps earlier.

### **Quarantine Measures.**

If transported in shipments, the beetle may, of course, occur at any point in the State, but to prevent its spread in this manner the Alabama State Board of Horticulture and the Federal Horticultural Board of the United States Department of Agriculture have quarantined the infested area and also a safety belt approximately 25 miles wide surrounding it. The State Plant Board of Mississippi has quarantined the same area and prohibits the shipment of all fresh beans and peas (except velvet beans, English peas, and dried beans and peas), all fresh vegetables, hays and similar forage crops, all nursery stock (except when such stock and packings have been fumigated by State or Federal authorities) into the State of Mississippi. This quarantine is enforced by inspectors stationed along the eastern border of the State at Meridian, Columbus, Tupelo, and Corinth, while inspectors at fifteen other points in the State will assist in making the quarantine more effective.

The Bureau of Entomology of the United States Department of Agriculture is expending \$100,000 in an effort to prevent the spread of the bean beetle and to study it with a view to eradication. Should these efforts be successful and the pest ultimately eradicated the benefit to the entire nation would be incalculable.

#### **Bean Beetle Possibly in Mississippi Now.**

As the Mexican bean beetle is believed to have been introduced into Alabama in hay shipments from Colorado, there is the same chance for it to be present in Mississippi. True, the State Plant Board of Mississippi has a quarantine against six western states (Colorado, Utah, Wyoming, Nevada, Idaho, and Oregon) prohibiting the shipment of hay into Mississippi on account of the alfalfa weevil, but as hay dealers could evade this quarantine in the past by re-routing this western hay and shipping it into Mississippi without giving any clue to its origin, it is quite possible for the bean beetle to have entered Mississippi in this manner. In the future this will be prevented by a Plant Board rule requiring that the origin of all hay shipments entering Mississippi shall be established by affidavit.

#### **Pea and Bean Fields Should Be Examined for this Pest.**

The farmers of Mississippi are, therefore, urged to closely examine their cowpea and soybean fields as well as their gardens for this pest. In case of the slightest doubt about an insect it should be sent at once to the Entomologist at Agricultural College for determination. In fact, it would be wise to send in any insects found damaging peas or beans, as it is very important that the Plant Board should know of its presence as soon as the beetle appears in the State. All communications will receive prompt and careful attention.

### **REPORT OF NURSERY INSPECTOR FOR THE QUARTER ENDING MARCH 31, 1921.**

Number of certified nurseries in Mississippi, March 31.....	95
Number of nursery dealers in Mississippi, March 31.....	12
Number of out-state nurseries having Mississippi permits, Mar. 31	157
Number Mississippi nurseries filing permits in other states, Mar. 31	29
Number states in which Mississippi certificates are filed, Mar. 31....	29
Number of nurseries inspected.....	61
Acres in nurseries inspected.....	173
Amounts of nursery stock inspected:	
Grafted and budded pecans.....	147,205
Seedling pecans.....	196,250
Total pecans.....	343,455
Citrus trifoliata.....	21,510
Orange.....	26,885
Grapefruit.....	500
Miscellaneous citrus.....	205
Total citrus stock.....	49,100
Apples.....	275
Pears.....	796
Japanese persimmons.....	700

Grapes.....	200
Miscellaneous.....	12
Total fruit stock (citrus excluded).....	1,983
Roses.....	32,075
Miscellaneous ornamentals.....	153,420
Total ornamental stock.....	185,495
Grand total of plants inspected.....	580,033

During the quarter the Nursery Inspector adjusted satisfactorily 241 claims between purchasers of fruit trees and out-state nurseries operating in Mississippi.

#### REPORT OF EDUCATIONAL DEPARTMENT FOR QUARTER ENDING MARCH 31, 1921.

Miles traveled on educational work.....	1,880		
Miles traveled on other work.....	1,025		
Lectures at schools (listed below).....	21		
Total attendance at lectures.....	3,100		
Lectures given at the following County Agricultural High Schools:			
Tishomingo	Newton	Noxubee	Jones
Tippah	Rankin	Chickasaw	Pearl River
Attala	Simpson	Webster	Forrest
Choctaw	Smith	Clay	Harrison-Stone
Winston	Jasper	Kemper	Lamar
			Clarke

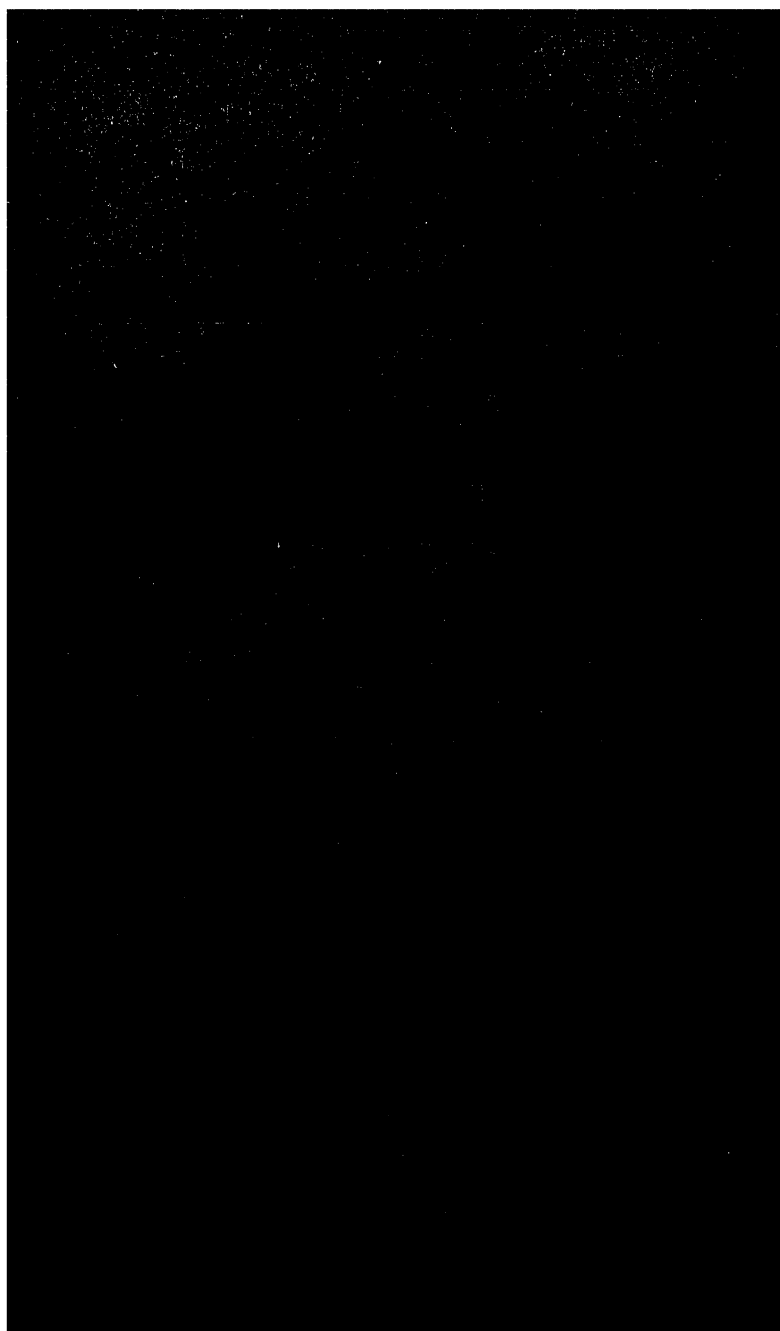
Five posters have been added to the first poster published by the Plant Board and the complete list is given below:

- Poster Number 1.—Pink Bollworm.
- Poster Number 2.—Mosaic Disease of Sugar Cane (State).
- Poster Number 3.—Mosaic Disease of Sugar Cane (County).
- Poster Number 4.—Sweet Potato Diseases.
- Poster Number 5.—Certified Sweet Potatoes.
- Poster Number 6.—Sweet Potato Weevil.

#### REPORT OF POTATO INSPECTOR FOR THE 1921 SEASON.

Compiled By J. C. Holton, Potato Inspector.

Number of inspections of seed sweet potatoes.....	174
Number of inspections of sweet potato plants.....	101
Number of potato field inspections in fall of 1920.....	80
Number of persons refused certificates because of disease.....	4
Number of certificates revoked because of disease.....	1
Number of certificate tags issued for in-state shipments of seed sweet potatoes and potato plants from Jan. 1, 1921.....	15,055
Number of certificate tags issued for out-state shipments of seed sweet potatoes and potato plants from Jan. 1, 1921.....	21,940







# THE ARGENTINE ANT IN MISSISSIPPI.

By R. W. HARNED, *Entomologist*.

During the past 20 years the Argentine ant has been gradually spreading from town to town throughout Mississippi until at the present time it occurs in at least 30 towns and 21 counties. It ranks among the most injurious insect pests that we have in this country. Like most of our other serious pests it was accidentally introduced from a foreign country before the United States had taken any precautions to keep out insect pests.

**Importance as a Pest.**—Where the Argentine ant occurs it not only takes first rank as a household pest, but is also a very serious pest to orchards, gardens, shade and forest trees, and many other plants. In the house the ants are everywhere—in the pantry, on the dinner table, and even in the beds. They feed on a great variety of substances such as sugars, jams, cakes, meats and many other foods. Out of doors these ants are serious chiefly because they protect and indirectly cause to be more abundant such serious pests as plant-lice, scale insects, and mealy-bugs.

**Means of Distribution.**—The Argentine ant has been carried from place to place by man. Its rapid spread may be said to be due largely to "Commercial Jumps." It came first to the United States undoubtedly with some cargo on board a boat from South America, as it was first observed in New Orleans in 1891 not far from the wharves by Mr. Edward Foster. It has been carried to many cities throughout the South such as Memphis, Nashville, Wilmington, Charleston, Atlanta, Mobile, and Houston. Mr. E. R. Barber has called attention to the fact that in most of these and other cities the ant has first become established in the wholesale districts. In Mississippi the larger railroad centers as Jackson, Meridian, Hattiesburg, Vicksburg, and Laurel, have all been infested for several years. Town after town along the Illinois Central Railroad in Mississippi has become infested with this pest until now probably every town on this road south of Jackson is infested. Durant, Kosciusko, Ackerman, Starkville, West Point, Aberdeen, and probably other towns along the Aberdeen Branch of the I. C. R. R. are now infested. At Starkville, however, the infestation was apparently first brought in over the Mobile & Ohio Railroad as the ants were first noticed at the Mobile & Ohio freight depot.

After the Argentine ant once becomes established in a town it may be carried rapidly to different parts of the town in loads of wood or in other material, but normally it spreads slowly. Mr. Barber's observations indicate that it will advance on an average between 300 and 400 feet a year.

**Other Ants.**—There are many different kinds of ants. Sometimes two or three different species may be infesting a house, but when the Argentine ant is present it soon drives all other ants

away; this, however, does not make it a beneficial insect as the Argentine ant is more injurious than all the others combined.

**Do You Have the Argentine Ant?**—The Plant Board is very anxious to determine the exact distribution of the Argentine ant in Mississippi. Each person who reads this article can help by sending in any ants that may be found in his vicinity. The ants may be killed by pouring kerosene, or boiling water on them. Then a number of the dead ants may be gathered up, placed in a tight box and mailed to the Entomologist, Agricultural College, Miss.

**Can the Argentine Ant Be Eradicated?**—So far as we know the Argentine ant has never been completely eradicated from any place where it has once become thoroughly established. It has, however, been so greatly reduced in numbers that the people living in the infested area have thought that it was completely eradicated. In other words, more than 99 per cent. of the ants have been killed out. It would seem that complete eradication is entirely possible in any community if the work should be continued in a thorough and systematic manner for a long enough period. This would mean that thorough and systematic scouting and inspection would have to be continued for a long period after all ants have apparently been destroyed. The work would have to be continued until the last colony of ants had been killed.

## CONTROL CAMPAIGNS IN MISSISSIPPI.

**How to Start a Campaign.**—In towns that are already known to be infested, the mayor or board of aldermen should request the Plant Board to survey the town, find the extent of infestation, and furnish an estimate of the cost of putting on a campaign. After this is done it rests entirely with the people of the town to decide whether they want to raise the required amount. The Plant Board is ready at any time to cooperate with town authorities over the State and a large supply of materials is kept on hand to prevent any delay in obtaining them. The ants can be most easily poisoned in the early spring or late fall as at these times their natural food supply is limited and they take the poisoned sirup more readily.

**History of Control Work in Mississippi.**—The first Argentine ant control campaign put on in Mississippi was in the nature of an experiment carried on by Mr. E. R. Barber at Hattiesburg several years ago. At that time only eight blocks were infested and Mr. Barber was finally able to so greatly reduce the ants that it was difficult to find them at all, and none could be found in any of the houses in this previously badly infested area. The people living on these eight blocks thought that the ants had been completely eradicated and undoubtedly considerably more than 99% of the ants had been killed.

During the fall of 1920 the Plant Board was able to put on four Argentine Ant Control Campaigns in cooperation with certain towns in the State. To have charge of the work the Plant Board was fortunate in securing Mr. Ernest R. Barber of the U. S. Bureau of Entomology, Audubon Park, New Orleans, Louisiana. Mr. Barber has probably had more experience with the Argentine ant than any other man in the United States, and the satisfactory control measures now known have been devised largely by him. The poison used by Mr. Barber in these campaigns consisted of a cooked sirup made of honey, sugar, and water in which was placed sodium arsenite, the active poison. Tartaric acid and benzoate of soda were added as preservatives. Anyone desiring further information about the Argentine ant should obtain a copy of Farmers' Bulletin No. 1101 by the United States Department of Agriculture entitled "The Argentine Ant as a Household Pest," by E. R. Barber.

**Woodville Campaign—September 13-17.**—This was the first campaign under the direction of the Plant Board. The infestation here was perhaps one of the heaviest in the State. Approximately 4,000 cans of poison were placed in the infested portions of the town. The campaign cost the city \$255.00 which was largely raised by local subscriptions. An additional expense of \$198.00 was borne by the Plant Board. All inquiries have shown this effort to have been very successful, many persons claiming that 95% to 99% of the ants were killed. Assurances have already been received that a follow-up campaign will be conducted this year.

**Crystal Springs Campaign—October 25-27.**—Five thousand cans of poison were distributed here at a cost of \$325.00 to the city and \$248.00 to the Plant Board. The people are highly enthusiastic over the results and the city authorities have already requested the Plant Board to submit an early estimate on the cost of a follow-up campaign this fall.

**Durant Campaign—October 28-29.**—This was the most systematic campaign of the season, there being no delays from shortage of materials such as hindered the work in other places. 2,000 cans of poison were distributed which cost the town \$167.00 and the Plant Board \$60.00. The people are very enthusiastic over the results and many have expressed their willingness to contribute to a fund for another campaign this fall.

**Laurel Campaign—October 30-November 8.**—This was the largest campaign of the season; 10,000 cans of poison were placed over the city at the rate of 3,300 per day. About 500 more cans should have been used. The campaign cost the city approximately \$900.00 and the Plant Board \$300.00. Inquiries as to the success of the campaign at this place have shown a greater diversity of opinions than in any other place. The city officials, however,

have heartily endorsed the campaign and are in favor of another one this fall if the funds can be raised.

**Successful Results Evident.**—In order to obtain accurate data as to the present degree of infestation in the towns that conducted campaigns last year, Mr. M. R. Smith, an assistant entomologist of the State Plant Board, has made a thorough investigation of these towns and reports that in each case the infestation is very light in comparison with last year. Interviews with a number of citizens at each place also confirmed his findings and heartily endorsed the control campaigns.

The letters printed below are self-explanatory:

**Louisiana Entomologist Makes Inquiry of Mississippi Mayors.**

BATON ROUGE, LA., June 14, 1921.

*Dear Sir:*

It is contemplated to put on a campaign against the Argentine ant in Baton Rouge this year, using the poison syrup method of control that has been perfected by Mr. E. R. Barber, Government Entomologist, stationed at Audubon Park, New Orleans, La.

I understand from Mr. Barber that he cooperated in putting on such a campaign in your city last year. We would appreciate it very much if you would write us concerning the results of this campaign, especially as to whether you think the results justified the expense.

Thanking you for any information that you may be able to give us along this line, I am,

Very truly yours,  
(Signed) THOS. H. JONES,  
(Copy) *Entomologist.*

**Reply from Mayor of Laurel.**

LAUREL, Miss., June 15, 1921.

MR. THOS. H. JONES, Entomologist,  
Louisiana State University,  
Baton Rouge, La.

*Dear Sir:*

Beg to acknowledge receipt of your letter of June 14th, with reference to the Ant Campaign conducted in city last year.

We wish to say that the people as a whole seemed to be highly pleased with the results of this campaign and think it well worth the expense of conducting same. It has proven to be very effective, although it must be followed up from time to time as it does not exterminate the ant entirely the first time.

We believe after you have tried it and see the results, you will find it to be a good thing and well worth the cost.

(Signed) F. M. MEEK,  
(Copy) *Mayor.*

**Reply from Mayor of Crystal Springs.**

CRYSTAL SPRINGS, MISS.

*Dear Sir:*

In reply, will say that the campaign was a success in every way and we want to put it on again this September.

(Signed)

(Copy)

Yours truly,

F. M. HUTCHINSON,

Mayor.

**Reply from Mayor of Woodville.**

WOODVILLE, MISS., June 15, 1921.

MR. THOS. H. JONES, Entomologist,

Louisiana State University,

Baton Rouge, La.

*Dear Sir:*

In reply to yours of the 13th, will say that we put on a campaign against the Argentine ant here last fall, under the direction of Mr. Barber, and the results were very satisfactory.

The town of Woodville paid for 4,000 cans with sponges, sugar and poison for same at a cost of approximately \$300.00. (This was based on 17 cent sugar.) The work of mixing and filling cans and in placing same was all done free, so I have no way of estimating the cost.

At the time the campaign was put on, there was hardly a house or store in town that was not badly infested with the Argentine ant, while for the last few months it is only here and there that they are found; there have been a good many noticed in the last two weeks since the rains have started, though nothing to compare with what there were last year.

The writer feels satisfied that the campaign here has already saved many times its cost, and we expect to put on another campaign this fall. I have canvassed the town pretty thoroughly and found only one person that can not see a great benefit in this work.

Yours very truly,

(Signed)

(Copy)

H. C. LEAK,

Mayor.

**Letter from Mayor of Durant.**

DURANT, MISS., July 20, 1921.

MR. R. W. HARNED,

Agricultural College, Miss.

*Dear Sir:*

Replying to your inquiry in regard to the ant campaign put on in this town last year beg to advise that the campaign was eminently satisfactory and our town was rid of a great number of these ants in a very short time and it is only recently

QUARTERLY BULLETIN FOR JULY, 1921

that we have been troubled again. It is our intention to put on the campaign in the fall as we think that we can permanently rid our town of these pests.

Respectfully,  
(Signed) JOHN B. WILKES,  
(Copy) Mayor.



AMERICAN NURSERY COMPANY  
McMINNVILLE, TENN.

**Guarantee**

The Model Home Orchard this day sold to.....G. W. Bates  
.....of Big Creek, Miss.,.....

is guaranteed to be first class PEDIGREED STOCK, free from disease and true to name. We also GUARANTEE to have our special salesman to visit this orchard for THREE years, spraying and pruning same at our expense, until the orchard is satisfactory to the planter. And if from any legitimate reason the orchard is unsatisfactory, at the expiration of the Demonstration work, we agree to refund the price paid for same.  
Date, May 27th, 1919

American Nursery Company  
L. L. Fuson, Salesman

Fig.1. The "Model Home Orchard" contract reads well and looks well but its promises are seldom carried out. Beware of such plans. See article on opposite page.

## FRUIT TREE BUYING.

By CLAY LYLE.

No other part of the home or farm means more to the health and happiness of the family than a good orchard. Scientists are telling us that fruits supply vitamins which are absolutely essential to the health and growth of the body. Furthermore, a good orchard becomes an integral part of the home and supplies an environmental touch of which no child should be deprived. Notwithstanding its importance, however, there are few divisions of the farm which receive more haphazard and careless attention than the orchard. This is true even from the purchase of the trees. Farmers who will give careful consideration to buying a plow will spend the same amount of money for fruit trees without investigating the reliability of the nursery or agent at all.

The purpose of this article is to give some advice about purchasing fruit trees, as during the past year or two many people of Mississippi have lost their money through unscrupulous agents. Because of this the Nursery Inspection Department has issued a rule requiring that all nursery agents or salesmen operating in Mississippi shall register with the Nursery Inspector and secure permission to do business. This regulation has met with hearty approval from bona fide nursery agents since it tends to place their business on a higher plane by eliminating the fly-by-night crooks who have undermined the reputation of all fruit tree salesmen in the past.

Buyers of fruit trees should beware of the agent who offers a greatly reduced price for cash payments, or, in fact, of any agent who insists on a cash payment when the order is given. A number of people in the vicinity of Houston, Ecru, Houlka, and other places were defrauded the past year in this manner by an agent who pretended that he needed just enough money to pay his railway fare home. The culprit was finally located and a warrant secured for his arrest, but he evaded the sheriff and escaped into Tennessee.

Beware of the agent also who insists that seedling trees are better than budded or grafted trees. To persons who know something about fruit trees it seems incredible that agents would make this claim but the writer has ample evidence that sales of this kind have been made not only to ignorant negroes but also to people who should know better. Exaggerated claims are frequently made by agents as to the date when their trees will begin producing, a recent instance occurring at Egypt where an agent had told an elderly lady that tiny seedling pecan trees, for which she had paid him two dollars each, would begin bearing in three or four years. So long as people are gullible enough to swallow any yarn an agent may tell, it will be a difficult task to formulate rules or laws that will protect them entirely.

Another agent to shun is the one who proposes to sell a complete orchard and keep it pruned and sprayed for a certain number



of years. During 1919 several out-state nurseries sold "Model Home Orchards" on this plan in Mississippi, and but little attempt has been made to carry out their agreements. A typical contract of this kind is shown on page 6. Any farmer who pauses to think will realize that it is impossible for these companies, located in other states, to prune and spray his orchard as cheaply as he can do the work himself. So when he buys the "model" orchard he is paying for service which cannot be rendered, even if the nursery intends to carry out the agreement, which, in many cases, is extremely doubtful.

The State Nursery Inspector also has a record of an agent who explained to the farmers that he was employed by the State of Mississippi during part of the year as a Spraying Demonstrator, and if they would buy his trees he would come around two or three times in his official capacity and spray their trees for them free of charge. Needless to say, he beguiled many a purchaser with this lie.

Another scheme which some agents have used in the past is to offer premiums with orders of certain amounts. Some even offered an automobile with a \$1,000 order of trees, while in other cases suits of clothes and household articles were offered as extra inducements. The premiums were never delivered of course, and the buyer was lucky who received any fruit trees at all for the money he had paid.

This article has dealt only with buying from agents because it is seldom that an unreliable nursery will advertise enough to make a mail-order business profitable. Some of the most reliable nurseries in the country, however, have no agents and handle everything by mail. This is cheaper than selling by agents and where the nursery has established a reputation for square dealing it is more profitable to both the customer and the nursery.

Because of the importance of putting out an orchard, prospective buyers should consult the State Nursery Inspector as to the reliability of nurseries and agents before placing an order. The nursery may be perfectly reliable and yet unwittingly employ an unscrupulous agent, hence it is well to investigate the agent also. Mississippi should have a hundred times as many fruit trees as she now has but the purchasers should use good judgment and common sense in getting them.

# THE QUARTERLY BULLETIN

## STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers and other publications of a similar nature.

R. W. HARNED, *Entomologist*.....EDITOR

HUNTER H. KIMBALL.....ASSOCIATE EDITOR

CLAY LYLE.....MANAGING EDITOR

Entered as second-class matter July 9, 1921 at the Postoffice at Agricultural College, Mississippi, under the act of June 6, 1900.

### NEW RULES REGARDING HAY SHIPMENTS.

At a recent meeting of the Plant Board, Rule No. 56-A-B-C was passed regulating the shipment of hay into Mississippi. This rule requires that all shipments of hay entering Mississippi shall be accompanied by permits from the Chief Inspector of the State Plant Board, the permit to be attached to the waybill and to remain on file in the office of the transportation company at the destination of the shipment.

These permits are issued when satisfactory evidence has been furnished regarding the origin of the shipments. This rule does not apply to shipments of hay from the states infested with the alfalfa weevil (Utah, Idaho, Colorado, Nevada, Wyoming, and Oregon), as shipments originating in these states are positively prohibited by Rule 42.

This new ruling became necessary on account of the fact that hay shipments from the infested states named above could easily be re-billed or split up into smaller quantities at Kansas City, St. Louis, or Memphis, and shipped into Mississippi without giving any clue to the origin. The new rule will require proof of the origin of all shipments and will thereby remove the danger of importing the alfalfa weevil which has existed heretofore.

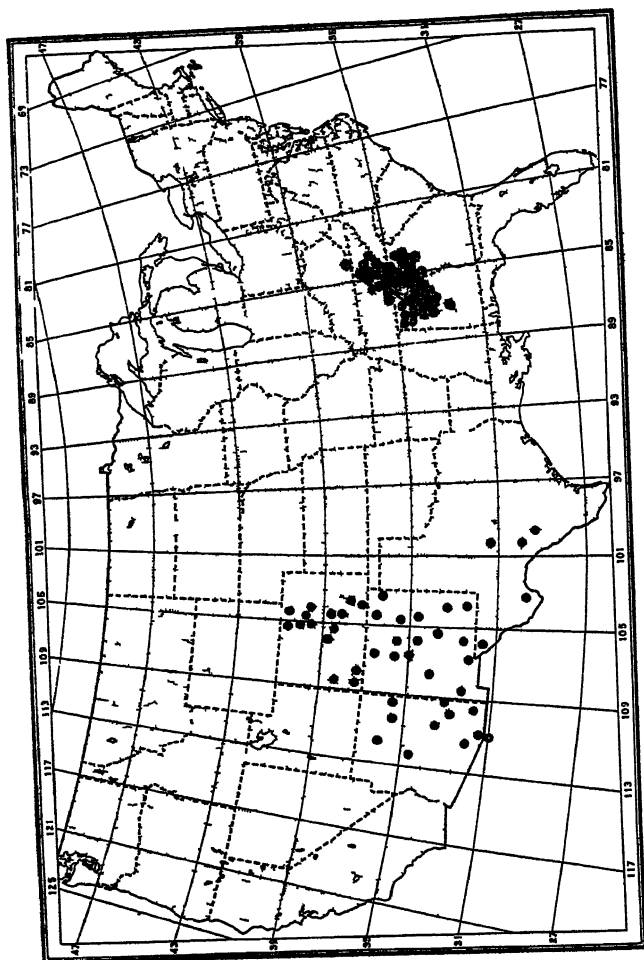


Fig 2 Map showing known distribution of Mexican Bean Beetle on  
July 1, 1921

**MEXICAN BEAN BEETLE SPREADING RAPIDLY.****Pest Now in Four Southern States.**

On July 1, the Mexican bean beetle had been reported within 18 miles of the Mississippi line and by the time this comes from the press it will perhaps be found much nearer the border or even within the State.

Extensive scouting during June has shown the rapid spread of this pest since last fall. In November, 1920, the infested area was estimated at 4,500 square miles in Alabama only. This, of course, does not include the area in Colorado, Arizona, New Mexico, and Southwest Texas where scattering infestations of the beetle have been found for many years. But on June 26, 1921, J. E. Graf, Entomologist in Charge of Field Control, reported its spread over 13,000 square miles in Alabama, more than 5,000 square miles in Tennessee, and an equal area in Georgia. Then on July 1 the discovery of the beetle in Whitley County, Kentucky, was announced, and on that date also the beetle was reported within two miles of the North Carolina border, 18 miles from Mississippi, 16 miles from South Carolina, and 100 miles from Florida. The map on the opposite page shows the known distribution of the beetle in the United States on July 1, 1921.

Further scouting will probably show the beetle spreading in all directions from these points, except perhaps southward, in which direction it has advanced but little. Farmers along the eastern border of Mississippi should carefully watch their garden beans, cowpeas, and soybeans for any insect damage, sending in to the Entomologist, at Agricultural College, any insects found on such plants. Eradication of the pest is now regarded as impossible but it is important that the Plant Board should know of its presence as early as possible after it enters the state to prevent any spread through transportation agencies.

The table below summarizes the inspections of beans and peas for the Mexican Bean Beetle during the second quarter, April 1, to June 30, 1921.

<i>County</i>	<i>Acres</i>	<i>Properties</i>
Adams.....	13.25	7
Bolivar.....	1.	1
Chickasaw.....	4.1	3
Clay.....	2.1	2
Forrest.....	9.	5
George.....	2.2	4
Jackson.....	44.2	23
Harrison.....	.75	2
Hinds.....	5.25	4
Kemper.....	44.4	9
Lamar.....	20.	1
Lauderdale.....	5.75	3

Lee.....	1.5	3
Lowndes.....	8.	6
Marshall.....	2.8	34
Noxubee.....	6.5	6
Tate.....	.1	1
Warren.....	.25	3
Washington.....	38.4	6
<b>TOTAL.....</b>	<b>209.55</b>	<b>123</b>

### BEE DISEASE ERADICATION REPORT.

The "Bee Disease Act" passed by the Mississippi Legislature in 1920 charged the State Plant Board with carrying out the regulations of the act in controlling and eradicating European and American Foulbrood, the most serious of bee diseases. Pursuant to this act, the Plant Board passed the necessary rules and quarantines early in 1921 and began a general survey of the Delta counties (the only section of the State where the diseases have been found) in June. The infected area was found to be much larger than expected and hence a longer time will be required to finish the preliminary survey.

Wherever infected colonies are found the owners are instructed as to the proper method of eradicating the disease and already marked progress has been noted. The cheerful and hearty co-operation of the beekeepers will be a great aid to rapid eradication. The figures below do not represent the total number of apiaries in the counties named as in many of them the inspections are not yet complete.

#### Summary of Apiary Inspections to July 1, 1921.

COUNTY	<i>Number of Apiaries</i>	<i>Number of Colonies</i>	<i>Number Infected European Foulbrood</i>	<i>Number Infected American Foulbrood</i>	<i>Man- Hours.</i>
Lauderdale.....	5	80	0	0	13
Warren.....	3	47	0	0	7½
Bolivar.....	19	387	144	3	96
Coahoma.....	14	150	69	0	51
Issaquena.....	1	3	0	0	½
Quitman.....	20	136	29	26	48½
Sharkey.....	23	156	23	0	32¾
Sunflower.....	10	57	8	0	8
Tallahatchie.....	1	41	23	0	10
Tunica.....	24	78	20	0	35¾
Washington.....	58	955	104	320	205½
<b>TOTAL....</b>	<b>178</b>	<b>2090</b>	<b>420</b>	<b>349</b>	<b>508½</b>

## ALFALFA SCOUTING REPORT

April 1-June 30, 1921.

Most of this scouting was done as the opportunity offered by inspectors employed on other work. No trace of the alfalfa weevil was found.

COUNTY	<i>Properties</i>	<i>Acres</i>
Bolivar.....	5	116.5
Coahoma.....	6	127.
Chickasaw.....	2	40
Lee.....	1	10
Lowndes.....	1	5
Monroe.....	45	2883
Tunica.....	1	25
Washington.....	1	35
TOTAL.....	62	3241

## REPORT OF THE QUARANTINE DEPARTMENT

From January 1, 1921, to June 30, 1921.

The quarantine work consists chiefly of inspecting plants and plant products:

1. Observed in process of transportation by common carriers, automobiles, wagons, passengers, etc., in the State.
2. Arriving at the ports on the Mississippi Gulf Coast.
3. Arriving at Mississippi post offices by parcel post.

The results obtained from the plant quarantine inspection service have been very gratifying. The strict enforcement of quarantine regulations has been shown to be of prime importance on numerous occasions since the passage of the "Plant Act of 1918." Several serious enemies of the agricultural interests of our State have been intercepted at points in the State by inspectors of the Board. Recently, Inspector R. P. Colmer, stationed at Pascagoula, destroyed some sweet potatoes arriving from Cuba, which potatoes had been found to be infested with the Sweet Potato Root Weevil (*Cylas formicarius*, Fab.). The Plant Board in cooperation with the United States Bureau of Entomology, is making favorable progress in the eradication of this pest from Mississippi. It would be folly to spend money on an eradication project and not prevent re-infestations of the pest from regions where it still occurs. A summary of the work done by this department for the past six months is given below:

## QUARANTINE INSPECTION REPORT

For Period from January 1, to June 30, 1921.

By GEO. F. ARNOLD,

*Assistant Entomologist in Charge Quarantine Inspection.*

## Ships and Vessels Inspected:

From Foreign Ports.....	46
From U. S. Ports.....	4
<b>TOTAL.....</b>	<b>50</b>

## Parcels Inspected:

## Arriving by Water—

Passed.....	8
Treated and passed.....	0
Returned to Shipper.....	4
Contraband destroyed.....	6
<b>TOTAL.....</b>	<b>18</b>

## Arriving by Land, Express, Freight, Wagon, etc.—

Passed.....	5698
Treated and passed.....	4
Returned to Shipper.....	480
Contraband destroyed.....	89
<b>TOTAL.....</b>	<b>6271</b>

## Arriving by Mail—

Passed.....	891½
Treated and passed.....	37
Returned to Shipper.....	14
Contraband destroyed.....	106½
<b>TOTAL.....</b>	<b>1049</b>

<b>GRAND TOTAL OF PARCELS INSPECTED.....</b>	<b>7338</b>
Total Parcels passed.....	6597½
Total Parcels treated and passed.....	41
Total Parcels returned to Shipper.....	498
Contraband destroyed.....	201½
<b>GRAND TOTAL.....</b>	<b>7338</b>

## REPORT OF NURSERY INSPECTOR

For the Quarter Ending June 30, 1921.

During this quarter 26 certificates were issued to agents or salesmen as required by Rule 34 B, recently adopted by the Plant Board.

Number of nurseries inspected.....	53
Acreage in nurseries inspected.....	308

*Amounts of Nursery Stock Inspected:*

Grafted and budded pecans.....	148,185
Seedling pecans.....	87,375

Total pecans.....	235,560
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Citrus trifoliata.....	38,550
Orange.....	58,157
Grapefruit.....	550
Miscellaneous citrus.....	240

Total citrus.....	97,497
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Apples.....	4,100
Pears.....	4,390
Japanese persimmons.....	150
Peach.....	9,530
Grapes.....	5,800
Figs.....	154,045
Strawberry.....	750
Miscellaneous fruit.....	904

Total fruit stock (citrus excluded).....	179,669
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Rose.....	257,275
Other ornamentals.....	870,194

Total ornamental stock.....	1,127,469
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Grand total of plants inspected during quarter.....	1,640,195
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RULES AND REGULATIONS  
OF THE  
*State Plant Board of Mississippi*  
IN EFFECT AUGUST 1, 1921.

These regulations authorized by the Mississippi Legislature under  
the "Plant Act of 1918" and amended in 1920.

STATE PLANT BOARD OF MISSISSIPPI  
AGRICULTURAL COLLEGE, MISSISSIPPI.

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## RULES AND REGULATIONS MADE BY THE STATE PLANT BOARD PURSUANT TO THE MISSISSIPPI PLANT ACT OF 1918 (AS AMENDED 1920)

RULE 1—Under the provisions of the Mississippi Plant Act of 1918, Chapter 219, approved March 27, 1918, the State Plant Board of Mississippi, in accordance with Section 7, of said Act, does declare the following insects and diseases, and each and every plant and thing infested or infected therewith, to be public nuisances.

### INSECTS AND PLANTS LIKELY TO BECOME INFESTED.

#### PINK BOLLWORM (PECTINOPHORA GOSSYPIELLA).

Cotton (*Gossypium* spp.).

#### ALFALFA WEEVIL (PHYTONOMUS POSTICUS).

Alfalfa (*Medicago sativa* and *M. s. faicata*).

#### EUROPEAN CORN BORER (PYRAUSTA NUBILALIS).

Favorite food plant is corn, but also feeds on almost any succulent plant.

#### JAPANESE BEETLE (POPILLIA JAPONICA).

Feeds on a large number of fruit, shade, and timber trees, small fruit, and ornamental plants, truck and field crops and weeds.

#### JAPANESE CAMPHOR SCALE (PSEUDAONIDIA DUPLEX).

Camphor, rose, oak, elm, mulberry, honeysuckle, pecan, peach, pear, and numerous other trees and plants.

#### GYPSY MOTH (PORTHETRIA DISPAR).

Alder, Speckled (*Alnus incana*).

Apple, (*Pyrus malus*).

Ash, Mountain (*Pyrus americana*).

Aspen, American (*Populus tremuloides*).

Aspen, Large-toothed (*Populus grandidentata*).

Balm-of-Gilead (*Populus balsamifera*).

Beech, American (*Fagus grandifolia*).

Birch, Gray (*Betula populifolia*).

Birch, Paper (*Betula papyrifera*).

Birch, Red (*Betula nigra*).

Box-elder (*Acer negundo*).

Barberry, European (*Berberis vulgaris*).

Bayberry (*Myrica carolinensis*).

Birch, Black (*Betula lenta*).

Birch, Yellow (*Betula populifolia*).

Blueberry, Low (*Vaccinium vacillans*).

Blueberry, Tall (*Vaccinium corymbosum*).

Chestnut (*Castanea dentata*).

Cherry, Sweet (*Prunus avium*).

Cherry, Wild Black (*Prunus serotina*).

Cherry, Wild Red (*Prunus virginiana*).

Chokeberry (*Aronia melanocarpa*).

Choke Cherry (*Padus nana*).

Cottonwood (*Populus deltoides*).

Cranberry, American (*Oxycoccus macrocarpus*).

Elm, American (*Ulmus americana*).

Elm, European (*Ulmus campestris*).

Elm, Slippery (*Ulmus fulva*).

Fern, Sweet (*Comptonia peregrina*).

Gum, Sweet, or Red (*Liquidambar styraciflua*).

Gum, Black (*Nyssa sylvatica*).

Gale, Sweet (*Myrica gale*).

Hawthorn (*Crataegus* spp.).

Hazlenut (*Corylus americana*).

Hazlenut, Beaked (*Corylus rostrata*).

Hemlock (*Tsuga canadensis*).

Hickory, Bitternut (*Hicoria cardiiformis*).

Hickory, Mockernut (*Hicoria alba*).

Hickory, Pignut (*Hicoria glabra*).

Hickory, Shagbark (*Hicoria ovata*).  
 Hornbeam, American (*Carpinus caroliniana*).  
 Hophornbeam (*Ostrya virginica*).  
 Larch, American (*Larix laricina*).  
 Larch, European (*Larix decidua*).  
 Linden, American (*Tilia americana*).  
 Linden, European (*Tilia* sp.).  
 Maple, Norway (*Acer plantanoides*).  
 Maple, Red or Swamp (*Acer rubrum*).  
 Maple, Silver (*Acer saccharinum*).  
 Maple, Sugar (*Acer saccharum*).  
 Oak, Black (*Quercus velutina*).  
 Oak, Rock Chestnut (*Quercus prinus*).  
 Oak, Dwarf Chestnut (*Quercus prinoides*).  
 Oak, Burr (*Quercus macrocarpa*).  
 Oak, Pin (*Quercus palustris*).  
 Oak, Post (*Quercus stellata*).  
 Oak, Red (*Quercus rubra*).  
 Oak, Scarlet (*Quercus coccinea*).  
 Oak, Bear (*Quercus ilicifolia*).  
 Oak, Shingle (*Quercus imbricaria*).

Oak, Swamp (*Quercus bicolor*).  
 Oak, White (*Quercus alba*).  
 Poplar, Lombardy (*Populus nigra*).  
 Pine, Pitch (*Pinus rigida*).  
 Pine, Red (*Pinus resinosa*).  
 Pine, Scotch (*Pinus sylvestris*).  
 Pine, Western White (*Pinus monticola*).  
 Pine, White (*Pinus strobus*).  
 Plum, Beach (*Prunus maritima*).  
 Pear (*Pyrus communis*).  
 Poplar, Silver (*Populus alba*).  
 Rose, Pasture (*Rosa virginiana*).  
 Service-berry (*Amelanchier canadensis*).  
 Sumac, Mountain (*Rhus copallina*).  
 Sumac, Scarlet (*Rhus glabra*).  
 Sumac, Staghorn (*Rhus hirta*).  
 Spruce, Black (*Picea mariana*).  
 Spruce, Norway (*Picea abies*).  
 Spruce, Red (*Picea rubens*).  
 Spruce, White (*Picea canadensis*).  
 Sassafras (*Sassafras sassafras*).  
 Willow, White (*Salix alba*).  
 Willow, Glaucous (*Salix discolor*).  
 Willow, Sandbar (*Salix interior*).  
 Witch-hazel (*Hamamelis virginiana*).

#### BROWN-TAIL MOTH (EUPROCTIS CHRYSORRHOEA).

Apple (*Pyrus malus*).  
 Apple, Crab (*Pyrus coronaria*).  
 Apricot (*Prunus armeniaca*).  
 Ash, Black (*Fraxinus nigra*).  
 Ash, Blue (*Fraxinus quadrangulata*).  
 Ash, Red (*Fraxinus pennsylvanica*).  
 Ash, White (*Fraxinus americana*).  
 Barberry (*Berberis vulgaris*).  
 Basswood (*Tilia americana*).  
 Beech, American (*Fagus grandifolia*).  
 Birch, Black (*Betula lenta*).  
 Birch, Gray (*Betula populifolia*).  
 Birch, Paper (*Betula papyrifera*).  
 Birch, Yellow (*Betula populifolia*).  
 Blackberry (*Rubus villosus*).  
 Box-elder (*Acer negundo*).  
 Cherry (*Prunus avium*).  
 Cherry, Wild Black (*Prunus serotina*).  
 Chestnut (*Castanea dentata*).  
 Chokeberry (*Aronia melanocarpa*).  
 Choke Cherry (*Padus nana*).  
 Crataegus, all species.

Creepers, Virginia (*Ampelopsis quinquefolia*).  
 Currant (*Ribes rubrum*).  
 Elm, American (*Ulmus americana*).  
 Elm, Cork (*Ulmus racemosa*).  
 Elm, English (*Ulmus campestris*).  
 Elm, Scotch (*Ulmus montana*).  
 Elm, Slippery (*Ulmus fulva*).  
 Gooseberry (*Ribes grossularia*).  
 Grape (*Vitis cordifolia*).  
 Hophornbeam (*Ostrya virginica*).  
 Hornbeam (*Carpinus caroliniana*).  
 Maple, Cut-leafed.  
 Maple, Red (*Acer rubrum*).  
 Maple, Sugar (*Acer saccharum*).  
 Maple, Sycamore (*Acer pseudo-platanus*).  
 Maple, White (*Acer dasycarpum*).  
 Oaks (*Quercus* spp.).  
 Peach (*Prunus persica*).  
 Pear (*Pyrus communis*).  
 Plum (*Prunus domestica*).  
 Plum, Beach (*Prunus maritima*).  
*Pyrus pinnatifida*.  
 Quince (*Cydonia vulgaris*).  
 Quince, Japan (*Cydonia japonica*).

Raspberry (*Rubus strigosus*).  
 Rose (*Rosa nitida*).  
 Shadbrush (*Amelanchier canadensis*).  
 Spiraea (*Spiraea thunbergii*).  
 Sumac, Mountain (*Rhus copallina*).  
 Sumac, Smooth (*Rhus glabra*).  
 Sumac, Staghorn (*Rhus hirta*).

Walnut, Black (*Juglans nigra*).  
 Weigela rosea.  
 Willow, Weeping (*Salix babylonica*).  
 Wistaria (*Wistaria consequana*).  
 Witch-hazel (*Hamamelis virginiana*).

### MEDITERRANEAN FRUIT FLY (CERATTIS CAPITATA).

Almond (*Amygdalus communis*).  
 Amatungula (*Carissa bispinosa*).  
 (C. *ardua*).  
 Apple (*Malus Sylvestris*) (*Pyrus malus*).  
 Apricot (*Prunus armeniaca*).  
 Avocado (*Persea americana*) (P. *gratissima*).  
 Banana (*Musa sapientum*).  
 Bean (*Phaseolus vulgaris*).  
 Barbary Fig (*Opuntia vulgaris*).  
 Belladonna (*Atropa belladonna*).  
 Carica quercifolia.  
 Carambola (*Averrhoa carambola*).  
 Cayenne or Surinam Cherry (*Eugenia uniflora*) (E. *michellii*).  
 Cerbera thevetia (*Thevetia nerifolia*).  
 Cherimoya (*Annona cherimola*).  
 Chinese Inkberry (*Cestrum* sp.).  
 Chrysobalanus ellipticus.  
 Citron (*Citrus medica*).  
 Cocoa-plum (*Chrysobalanus icaco*).  
 Coffee (*Coffea arabica*).  
 Eggplant (*Solanum melongena*).  
 Elengi Tree (*Mimusops elengi*).  
 Fig (*Ficus carica*).  
 Gooseberry, Barbados (*Pereskia aculeata*).  
 Granadilla (*Passiflora quadrangularis*).  
 Grape (*Vitis vinifera*).  
 Grapefruit (*Citrus grandis*) (C. *decumana*).  
 Grunmixiama or Brazilian Cherry (*Eugenia dombeyi*) (E. *brasiliensis*).  
 Guava (*Psidium guajava*).  
 Japanese Persimmon (*Diospyros kaki*).  
 Jerusalem Cherry (*Solanum pseudo-capsicum*).  
 Kafir-plum (*Harpephyllum caffrum*).  
 Kei Apple (*Dovyalis caffra*) (*Aberia caffra*).  
 Kumquat (*Fortunella japonica*) (*Citrus japonica*).

Lemon (*Citrus limonium*) (C. *medica* var. *limon*).  
 Lime (*Citrus aurantifolia*) (C. *limetta*).  
 Loquat (*Eriobotrya japonica*).  
 Malay Apple (*Caryophyllus malaccensis*) (*Eugenia malaccensis*).  
 Mammee Apple (*Mammea americana*).  
 Mandarin Orange (*Citrus nobilis deliciosa*).  
 Mango (*Mangifera indica*).  
 Medlar (*Mespilus germanica*) (*Pyrus germanica*).  
 Natal Plum (*Clarissa grandiflora*).  
 Noronhia emarginata.  
 Orange Jessamine (*Chalcas exotica*). (*Murraya exotica*).  
 Papaya (*Carica papaya*).  
 Passion Flower (*Passiflora caerulea*).  
 Peach (*Amygdalus persica*) (*Prunus persica*).  
 Pineapple (*Ananas sativus*).  
 Prickly Pear (*Opuntia tuna*).  
 Quince (*Cydonia oblonga*) (*Pyrus cydonia*).  
 Red Peppers (*Capsicum* spp.).  
 Rose Apples (*Caryophyllus jambos*). (*Eugenia jambos*).  
 Round Kamani Mastwood (*Calophyllum inophyllum*).  
 Sapodilla, Chicle (*Achras sapota*).  
 Sour Cherry (*Prunus cerasus*).  
 Sour or Seville Orange (*Citrus aurantium*).  
 Soursop (*Annona muricata*).  
 Squash, Pumpkin, Gourd (*Cucurbita* spp.).  
 Starapple (*Chrysophyllum calnito*).  
 Strawberry Guava (*Psidium cattleianum*).  
 Sweet Orange (*Citrus sinensis*).  
 Tomato (*Lycopersicon esculentum*).  
 Winged Kamani (*Terminalia es-tappa*).



# MEXICAN ORANGE MAGGOT OR MORELOS FRUIT WORM (ANASTREPHA (TRYPETA) LUDENS LOEW.).

Guava (*Psidium guajava*).  
Mango (*Mangifera indica*).  
Orange (*Citrus sinensis* and *C. aurantium*).

Peach (*Amygdalus persica*).  
Plum (*Prunus* sp.).  
Sapodilla (*Achras sapota*).  
Sweet Lime (*C. limetta*).

## COTTON SQUARE WEEVIL (ANTHONOMUS VESTITUS).

Cotton (*Gossypium* Spp.).

# SPINY CITRUS WHITE FLY (ALEUROCANTHUS WOGLUMI).

Avocado.  
Capparis spp.  
Cestrum nocturnum.  
Citrus.  
Coffee.

Guava.  
Lignum vitae.  
Mango.  
Salacca reticulata.

## WEST INDIAN SWEET POTATO WEEVIL (EUSCEPES BATATAE WATERHOUSE).

Sweet Potato.

# DISEASES AND PLANTS LIKELY TO BECOME INFECTED.

## CITRUS CANKER (PSEUDOMONAS CITRI HASSE).

Citrus trees and plants, including the following:

Bergamont (*Citrus bergamia*).  
Includes various kinds of medicinal citrus.

Bigarade Orange (*C. vulgaris*).  
Includes the bittersweet, sour, and others of this type.

Citron (*C. medica*).  
Includes various varieties of Citrons; also Cedrat.

Grapefruit, or Pomelo (*C. decumana*).

Hybrids.

Includes the hybrids between various species of citrus; known under different names, such as Morton, Rusk, Citrange, Pomerange, Tangelo, etc.

Kumquat (*C. japonica*).  
Includes the various kinds of kumquats.

Lemon (*C. limonium*).  
Includes various varieties of lemon,

also rough lemon, ever-bearing lemon, ponderosa lemon.

Lime (*C. limetta*).

Includes various varieties known as Key Lime, Mexican Lime, West India Lime, etc.

Mandarin Orange (*C. nobilis*).  
This includes all varieties of "kid glove" oranges grown in Mississippi, such as Satsuma, Tangerine, King, Oneco, etc.

Otaheite (*C. sinensis*).

Pomelo—see grapefruit.

Shaddock (*C. decumana*).

As separate from Pomelo, this includes several varieties.

Sweet Orange (*C. aurantium*).

This includes all round oranges commonly grown for commercial purposes in Mississippi.

Trifoliolate Orange or "Citrus trifoliata" (*Poncirus trifoliata*).

## BROWN ROT (PYTHIACYSTIS CITROPHORA).

Lemons, Oranges.

## POTATO WART DISEASE.

Irish Potatoes.

**RULE 2**—The following insects, pests and diseases are hereby declared to be especially injurious and are declared to be insects, pests and diseases which should be controlled and their dissemination

tion prevented, within the intent and meaning of Section 14 of the Mississippi Plant Act of 1918:

INSECT, PEST, OR DISEASE.	PLANTS LIKELY TO BECOME INFESTED OR INFECTED.
Camphor Thrips ( <i>Cryptothrips floridensis</i> ).....	Camphor.
Pear Thrips ( <i>Euthrips pyri</i> ).....	Pear.
Red-banded Thrips ( <i>Heliothrips rubrocinus</i> ).....	Avocado, Guava, Mango.
Cloudy-winged White-Fly ( <i>Aleyrodes nubifera</i> ).....	Citrus, Indian Laurel, <i>Ficus nitida</i> .
White-Fly ( <i>Aleyrodes flori-densis</i> ).....	Avocado, Guava.
White-winged White-Fly ( <i>Aleyrodes citri</i> ).....	Blackberry, Boston Ivy, Button Bush, ( <i>Cephalanthus occidentalis</i> ), Cape Jessamine ( <i>Gardenia</i> ), Cherry Laurel, Chinaberry, Citrus, Coffee, English Ivy, <i>Ficus</i> sp., Green Ash, Honeysuckle, Japonica ( <i>Camellia japonica</i> ), Jessamine ( <i>Jasminum</i> sp.), Mexican Orange, ( <i>Choisya ternata</i> ), Oleander, Osage Orange ( <i>Maclura aurantiaca</i> ), Persimmon (Japanese and native), Pomegranate, Portugal Cherry, Prickly Ash, Smilax, Scrub Palmetto, Tree-of-Heaven, Trumpet Flower ( <i>Tecoma radicans</i> ), <i>Viburnum nudum</i> , Water Oak, Wild Olive.
Woolly White Fly ( <i>Aleyrodes howardii</i> ).....	Citrus.
<i>Paraleyrodes perseae</i> .....	Citrus, Avocado, <i>Persea carolinensis</i> .
California Red Scale ( <i>Chrysomphalus aurantii</i> ).....	Citrus, Rose.
Chaff Scale ( <i>Pariatoria pergandii</i> ).....	Citrus, Camellia, <i>Coccoloba plumosa</i> .
Citricola Scale ( <i>Coccis citri-cola</i> ).....	Citrus, Elm, Nightshade, Pomegranate, Walnut.
Citrus Mealy-bug ( <i>Pseudococcus citri</i> ).....	Begonia ( <i>Bignonia</i> sp.), Bottle Bush ( <i>Calistemon lanceolatus</i> ) <i>Bouvardia</i> sp., <i>Ceanothus integerrimus</i> , Citrus, Coleus, Coffee, Cotton, Croton, <i>Cyperus alternifolius</i> , English Ivy, Ferns ( <i>Filicales</i> ), <i>Fuchsia</i> , Guadalupe Island Palm ( <i>Erythea edulis</i> ), <i>Habrothamnus</i> , <i>Ipomea</i> , <i>Learii</i> , Oleander, Peony, Poinsettia ( <i>Euphorbia pulcherrima</i> ), Pineapple, Pumpkin, Purple Passion Flower ( <i>Passiflora violacea</i> ), <i>Solanum douglasii</i> , <i>Solanum jasminoides</i> , <i>Strelitzia gigantea</i> , <i>Strelitzia regina</i> , Tobacco, Variegated Wandering Jew.
Cottony-cushion Scale ( <i>Icerya purchasi</i> ).....	Acacias, Ambrosia, Apple, Apricot, Australian Pine, Banyan, Careless Weed, Castor Bean, <i>Chenopodium</i> , Citrus, Coconut Palm, Coleus, Dwarf Flowering Almond, Fig, Goldenrod, Grape, Gumbo Limbo, Locust, Magnolia, Mulberry, Myrtle, Nettle, Nightshade, Peach, Pecan, Pepper,

- Pine, Pomegranate, Potato, Purslane, Quince, Rosa de Montana, Rose-geranium, Roses, Royal Poinciana, Sapodilla, Shepherd's Needle, Spanish Lime, Spanish Mulberry, Spearmint (*Melicocca bijuga*), Stonecrop (*Sidum* sp.), Sunflower, Sweet Gum, Verbena, Veronica, Walnut, White Oak, Willow.
- Dictyospermum Scale (*Chrysomphalus dictyospermi*)..... Arbor-vitae, *Auracaria* sp., Camphor, Cape Jessamine, Citrus, *Cycas*, *Erythrina indica*, *Ficus* sp., *Kentia belmoreana*, *Latania*, Mango, Rose.
- Florida Red Scale (*Chrysomphalus aonidium*)..... *Aspidistra lurida*, *Auracaria bidwellii*, Australian Oak (*Grevillea robusta*), Banana, *Begonia magnifica*, Camphor-tree, Cinnamon, Citrus, Coconut, Coffee, *Dictyospermum album*, Eucalyptus, *Ficus elastica*, *Ficus nitida*, Guava, *Ilex latifolia*, *Ilex lurida*, Japonica, Mammee Apple (*Mammea Americana*), Mango, Oleander, Palms, Pandarus, *Rhododendron arboreum*, Rose.
- Florida Wax-scale (*Ceroplastes floridensis*)..... *Andromeda*, *Anona reticula*, *Anthurium*, Cinnamon, Citrus, *Euonymus japonicus*, Fig, Guava, *Ilex glabra*, Lignum-vitae, Mango, Myrtle, Oleander, Pomegranate, Quince, Red Bay Tea.
- Long Scale (*Lepidosaphes gloverii*)..... Citrus, *Magnolia fuscata*.
- Mango Scale (*Pulvinaria psidii*)..... Citrus, Fig, Guava, Henna Bush, Loquat, Mango, Mastic, Omelet Tree (*Blighia sapoda*), Sapodilla, Satinleaf, Star-apple, Wild Rubber.
- Putnam Scale (*Aspidiotus ancyclus*)..... Apple, Ash, Beech, Bladdernut, Cherry, Currant, Hackberry, Linden, Maple, Oak, Osage Orange, Peach, Pear, Pecan, Plum, Quince, Snowball, Willow.
- Purple Scale (*Lepidosaphes beckii*)..... *Banksia integrifolia*, *Cercidiphyllum japonicum*, Citrus, Croton, *Eleagnus*, Fig, *Ilex cornuta*, Oak, Olive, *Pomaderris apetala*, *Taxus cuspidata*.
- Pyriform Scale (*Protopulvinaria pyriformis*)..... Avocado, Cape Jessamine, English Ivy, Guava, *Rhyncospermum*.
- San Jose Scale (*Aspidiotus perniciosus*)..... Acacia, *Actinidia*, Alder, Almond, American Linden, Apple, Apricot, Ash, Black Walnut, Carolina Poplar, *Catalpa speciosa*, Cedar Chestnut, *Citrus trifoliata*, Cotton-easter, Crab-apple, *Crataegus*, Currant, Cut-leaved Birch, Dogwood, Elm, English Walnut, English Willow, *Eucalyptus corynocalyx*, *Euonymus*, European Linden, Golden-leaved Poplar, Golden Willow, Gooseberry, Hawthorn, Huckleberry, Japan Plum, Japanese Quince, Japan Wal-

- nut, Juneberry, Laurel, Laurel-leaved Willow, Lemon, Lime, Lombardy Poplar, *Lonicera xylosteum*, Maple, Milkweed, Orange, Osage Orange, *Prunus avium*, Peach, Pear, Pecan, Persimmon, Poplar, *Prunus domestica*, Plum, *Prunus pissardi*, *Prunus maritima*, *Ptelea trifoliata*, Quince, Raspberry, Rose, Snowball, Spiraea, Spruce, Strawberry, Sumac, *Symphoricarpos racemosus*, Weeping Willow.
- Soft Brown Scale (*Coccus hesperidum*).....Abutilon, *Morus nigra*, Box, Camellia, Cinnamon, Citrus, *Clematis flammula*, *Convolvulus tricolor*, *Cycas revoluta*, Holly, Ivy, Jessamine, Laurel, Mimosa, Myrtle, Oleander, Phlox.
- Snow Scale (*Chionaspis citri*).....Citrus, *Euxonymus latifolius*, *Osmanthus*, Palms.
- Walnut Scale (*Aspidiotus juglans-regiae*).....Apple, Apricot, Cherry, Japan Plum, Locust Maple, Peach, Pear, Pecan, Walnut.
- Zizyphus Scale (*Parlatoria zizyphus*).....Citrus, Date-palm, *Zizyphus pinna-christi*.
- Cane Leaf-hopper (*Perkinsiella saccharicida*).....Sugar Cane.
- Cane Sharpshooter (*Delphacodes saccharivora*).....Sugar Cane.
- Pecan Budworm (*Proteotermes deludana*).....Hickory, Pecan.
- Pecan Case-bearer (*Acrobasis nebulella*).....Hickory, Pecan, Walnut, Wild Crab, (*Crataegus*).
- Pecan-tree Borer (*Sesia scitula*).....Chestnut, Dogwood, Hickory, Oak, Pecan.
- Blue-green Citrus Beetles (*Pachnaeus opalus*, *P. distans*, *P. litus*, and *P. azurescens*).....Citrus.
- Pecan Girdler (*onciderea cingulata*).....Hickory, Pecan, Persimmon, Rose, Walnut.
- Red and Black Citrus Weevil (*Praepodes vittatus*).....Citrus
- Striped Citrus Weevil (*Diaprepes spengleri*).....Citrus.
- Sweet Potato Weevil (*Cylas formicarius*).....Sweet Potato, Morning Glory, and Bindweed.
- Argentine Ant (*Iridomyrmex humilis*).....Fig, Orange.
- Mexican Bean Beetle (*Epilachna corrupta*, Muls.).....Beans, Cowpeas, Soybeans, and various other leguminous crops.
- Purple Mite (*Tetranychus mytilaspidis*).....Citrus.
- Six-spotted Mite (*Tetranychus sexmaculatus*).....Citrus.
- Root Knot (*Heterodera schachtii*).....*Aloysia citrodora*, Asparagus, Banana, Bean, Beet, Cabbage, Cantaloupe, Careless Weed, Carrot, Catalpa, Cauliflower-

	Celery, Cotton, Cowpeas, (most), Cucumber, Eggplant, Fig, Grapes (old world), Hibiscus, Honeysuckles, Irish Potato, Japanese Persimmon, Kale, Lettuce, Mulberry, Mustard, Okra, Peach, Peanut, Peas, Pecan, Papaya, Peony, Pepper, Pineapple, Pokeweed, <i>Primula obconia</i> , Quince, Radish, Rape, Rose, Salvia, Soy Bean, Squash, Sweet Potato, Sugar Cane, Tobacco, Violet, Watermelon, Wistaria.
Blight ( <i>Bacillus amylovorus</i> ).....	Apple, Loquat, Pear.
Bundle Blight ( <i>Pseudomonas vascularum</i> ).....	Sugar Cane.
Crown Gall ( <i>Pseudomonas tumefaciens</i> ).....	Apple, Grape, Oleander, Peach, Pear, Plum, Rose.
Chestnut Bark Disease ( <i>Endothia parasitica</i> ).....	Chestnut.
Citrus Scab ( <i>Cladosporium citri</i> ).....	Citrus.
Dieback of Pecan ( <i>Botryosphaeria berengeriana</i> ).....	Pecan.
Foot Rot ( <i>Fusarium limonis</i> ).....	Citrus.
Gray Fungus Gummosis ( <i>Botrytis vulgaris</i> ).....	Lemon.
Leaf Blotch ( <i>Cercospora fusca</i> ).....	Pecan.
Little Peach.....	Peach.
Melanose ( <i>Phomopsis citri</i> ).....	Citrus.
Nursery Blight ( <i>Phyllosticta caryae</i> ).....	Pecan.
Peach Rosette.....	Peach.
Peach Yellows.....	Peach.
Pecan Rosette.....	Pecan.
Pecan Scab ( <i>Fusicladium effusum</i> ).....	Pecan.
Powdery Scab.....	Irish Potato.
Rot of Citrus ( <i>Diplodia natalensis</i> ).....	Citrus.
Scab ( <i>Actinomyces chromogenus</i> ).....	Irish Potato.
Scaly Bark ( <i>Cladosporium herbarum</i> var. <i>citricolum</i> ).....	Citrus.
Stem-end Rot ( <i>Phomopsis citri</i> ).....	Citrus.
Withertip ( <i>Colletotrichum gloeosporioides</i> ).....	Avocado, Citrus, Mango.
Black Rot of Sweet Potato.....	Sweet Potato.
Mosaic Disease of Sugar Cane.....	Sugar Cane, Sorghum, Corn, Rice, Millet, Crab grass, <i>Panicum</i> .
Stem Rot of Sweet Potato.....	Sweet Potato and Egg Plant.

**RULE 3**—Inspectors employed by the Plant Board shall examine trees, plants and plant products in nurseries, orchards and other places within the State of Mississippi, in order to determine whether such trees, plants and plant products are infested or infected with any insect, pest or disease declared to be or listed by the State Plant Board as being either a public nuisance or an especially injurious insect, pest or disease, and shall report their findings to the Plant Board.

RULE 4—The planting, transplanting or otherwise moving of any plants which are infected with citrus canker, or which, in the opinion of an inspector of the Plant Board, are likely to carry canker infections, is prohibited.

RULE 5—All plants found to be infected with citrus canker shall be entirely destroyed by burning, and without being cut, or otherwise handled or moved. Further, the ground shall be thoroughly burned for a distance of three feet beyond the utmost spread of the branches of the infected plant.

RULE 6—Every grove, nursery or separate plant situated in the State of Mississippi which has been found to be infected with citrus canker is hereby declared to be the center of an infected and dangerous zone.

RULE 7—The planting or movement of citrus plants within a zone extending one-half mile in every direction from said center is hereby prohibited until such time as in the judgment of the Board such dangerous conditions may have ceased to exist; provided, that citrus trees or plants in such zone may be moved within a property located more than one-quarter of a mile from the center of such zone, when moved under the supervision of an agent of the Plant Board, and provided, further, that citrus trees from certified nurseries may be planted as re-sets in non-infected groves located within such zone when such replanting is done under the supervision of an agent of the Plant Board, and provided, further, that citrus trees or plants located within such zone may be budded by and with the consent and approval of the Chief Inspector under such precautions and conditions as he may specify.

RULE 8—No certificate shall be issued for the movement of citrus nursery stock located within one-half mile of any center of infection as defined by Rule 6 until such time as in the judgment of the Board the dangerous conditions in such center may have ceased to exist.

RULE 9—The movement of non-citrus trees and plants from within any canker-infected grove or nursery is prohibited until such time as in the judgment of the Board the dangerous conditions in such property may have ceased to exist.

RULE 10—The planting or movement of citrus trees or plants within any canker-infected property or center as defined by Rule 6 is hereby prohibited until the Board shall have declared such property to be no longer a dangerous center, and thereafter until the soil in such infected property shall have been disinfected in such manner, to such an extent and under such conditions as may be prescribed by the Chief Inspector.

RULE 11—No certificate shall be issued for the movement of nursery stock from a nursery in which vehicles, teams, laborers

or other persons, nursery implements or other things enter, that likewise enter or are used in any nursery or grove infected with citrus canker.

**RULE 12**—The planting, cultivating or harvesting of any truck or field crop in a grove or nursery which is, has been, or shall become infected with citrus canker, is hereby prohibited until such times as the Chief Inspector may deem such procedure unlikely to spread citrus canker.

**RULE 13**—Hereafter work in properties infected with citrus canker shall be carried on by the owner or his employees, under the general supervision of agents of the Plant Board. Said agents shall have authority such that in case the work in infected properties is being carried on in such manner as to make likely the spread or dissemination of citrus canker, whether within the affected property or other properties, they may so restrict the manner of carrying on such work as to prevent as far as possible the spread of the disease.

**RULE 14**—The harvesting of citrus fruits from any grove which is, has been or shall become infected with citrus canker is hereby prohibited except when such harvesting shall be carried on under the immediate supervision of an agent of the Plant Board. Said agent of the Board shall be authorized to prescribe such precautions in connection with the harvesting of such fruit and the hauling or otherwise moving thereof as shall, as far as possible, render unlikely the further dissemination of citrus canker.

The packing of citrus fruit from such an infected property shall be carried on only under the immediate supervision of an agent of the Board. Said agent shall be authorized to prescribe such precautions in connection with the packing and otherwise handling of such fruit for shipment as shall, as far as possible, render unlikely the further dissemination of citrus canker.

The shipment of citrus fruit consigned to any point in the State of Mississippi from such an infected grove or from any packing house in which the fruit from such an infected grove has been prepared for shipment is hereby prohibited.

The shipment of citrus fruit in bulk or otherwise than wrapped and packed in standard crates from such infected property or from any packing house in which fruit from an infected property is prepared for shipment is hereby prohibited, and the acceptance thereof for transportation by a common carrier is likewise prohibited.

Provided, that this rule shall not apply to such properties as have been declared by the Board as no longer infected with citrus canker.

**RULE 15**—The pasturing, or allowing to run at large, of live stock, poultry and hogs included, in any grove or other property which is, has been or shall become infected with citrus canker, is

hereby prohibited until such time as the Board may deem such procedure unlikely to spread citrus canker.

**RULE 16**—On account of the danger of further spreading citrus canker the practice of using leaves, twigs or branches of citrus trees and the products obtained therefrom for the purpose of disseminating the fungi used for the control of the white fly and citrus scale insects is hereby restricted to the use of such material as may be obtained from trees located outside the limits of any area declared by the Board to be dangerous on account of the prevalence of citrus canker therein and the picking, shipping or using of leaves, twigs or branches taken from trees located within such dangerous area is hereby prohibited.

**RULE 17**—The owners, officers and employees of any nursery which may be found at any time to be infested or infected with any especially injurious insect pest or disease, or which has heretofore been so infested or infected, shall, on demand of the Entomologist, furnish a list of all shipments and sales of nursery stock from said nursery from any date set by the Entomologist up to and including the date of such demand. Said list shall show the names and addresses of all purchasers, the names and addresses of all consignees and a complete description of the stock included in each and every shipment.

**RULE 18**—Every grove, field, nursery or other property in which has been found any disease or insect pest which has been declared a public nuisance by the State Plant Board under the provisions of the Plant Act of 1918, shall be conspicuously posted with signs warning all parties against trespassing, said signs to read as follows: "No Trespassing. By Order of the State Plant Board." The words "NO TRESPASSING" to be in letters no less than four inches in height and the words "State Plant Board" to be in letters not less than two and one-half inches in height, such letters to be of prominent bold-faced type, easily read. The mutilation, defacing, removing or destroying of such signs by any parties whomsoever is hereby prohibited. Provided, that the posting of such notices shall not be required in the case of any property which has been declared by the State Plant Board to be no longer a danger center.

**\*RULE 19**—In order to prevent the introduction of the citrus disease known as citrus canker, the importation into Mississippi of any and all kinds of citrus trees and parts thereof, including budwood and scions, and all other host plants of this disease as soon as discovered, except certain fruit intended for use as food products, is hereby prohibited. Provided, that importations of limited quantities of new or rare varieties may be allowed by special permit of the Entomologist. Applications for such permits must be made to the Entomologist, Agricultural College, Mississippi.

\*Modified by Rule 43.



**RULE 20**—Any person affected by any rule or regulation made or notice given pursuant to the Mississippi Plant Act of 1918, may have a review thereof, for the purpose of having such rule, regulation or notice modified, suspended or withdrawn, by filing a written request with the Chairman of the State Plant Board, stating the particular rule, regulation or notice regarding which action is desired and setting forth the objections to the enforcement of said rule, regulation or notice.

At the time of filing said written request the person asking for such review shall deposit a certified check for one hundred dollars (\$100) with the Chairman of the Board, or, in case the destruction of property is involved, with the agent of the Board responsible for the carrying out of the provisions of the Mississippi Plant Act of 1918 in the locality in which the property is located. Said sum of \$100 is to be applied towards defraying the expenses of a special meeting of the Board, providing the Chairman considers the exigencies of the case require action before the next regular meeting.

In case such special meeting is called the Secretary of the Board shall present an account of the expenses incurred for holding said meeting and if these expenses are less than \$100 the balance shall be returned to the person requesting the review.

On such review all facts and representations offered on behalf of the applicant or on behalf of the Board may be presented to the Board in the form of affidavits.

The operation or enforcement of any rule or regulation made or notice given by the Board is not to be held in abeyance pending a review thereof but is to remain in full force and effect until modified, suspended or withdrawn by action of the Board. Providing that where the enforcement of a rule requires the destruction of the property of the party making the appeal to the Board in the manner aforesaid and the said sum of \$100 to cover costs having been deposited with an agent of the Board, such destruction shall be suspended until the party shall have had the opportunity of being heard on his appeal; provided, that the party thus appealing complies with the instructions of the agent of the Board to the end that no especially injurious insect pest or disease shall be disseminated.

**RULE 21**—Any and all plants or plant products subject to the provisions of the Mississippi Plant Act of 1918, whether in transit or in the hands of the possessor, may be held for inspection regardless of whether they are certified or not, and if such plants or plant products are found to have been moved or transported in violation of the rules or regulations of the Plant Board, or if found infested or infected with any injurious insect pest or disease, such plants or plant products must be deported, sprayed or otherwise treated upon the order of the Entomologist, if in his opinion this is necessary for the protection of the agricultural or horticultural interests of the State.

RULE 22 A—Any article or any box, bundle, parcel or other container which has been intercepted, while in transit, by an agent of the State Plant Board and is being held subject to examination or determination as to final disposition shall have attached to it a tag clearly indicating to employees of the transportation companies and the public, that the article or container to which the tag is attached is being held subject to the rules and regulations of the Board. This tag shall be known as the "Hold Out Tag," and shall be in substantially the following form:

<p style="text-align: center;"><b>HOLD OUT FOR INSPECTION</b></p> <p>Do not remove this package from this station</p> <p>O until this tag has been removed, and the contents of package inspected and certified by the Inspector of the STATE PLANT BOARD OF MISSISSIPPI</p> <p>(over)</p>	UNDER QUARANTINE
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<p style="text-align: center;"><b>WARNING</b></p> <p>This package and its contents are being held in quarantine. All persons are hereby warned not to open, destroy or remove the same under penalty of</p> <p>O prosecution.</p> <p>By order of</p> <p style="text-align: center;">R. W. HARNED, <i>Entomologist</i></p> <p style="text-align: center;">----- <i>Quarantine Inspector.</i></p> <p>(over)</p>	UNDER QUARANTINE
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The use of this tag or the removal of same from any article or container, to which it is attached, by any person other than an authorized agent of the Plant Board, is forbidden.

RULE 22 B—The movement or shipment of, or tampering with, any article or any box, bundle, parcel or other container having attached thereto a Hold Out Tag, which tag has been attached by an agent of the State Plant Board, is prohibited until such article or the contents of such box, bundle, parcel or other container shall have been inspected, the Hold-Out Tag removed therefrom and the article or container officially released by an agent of the Board.

RULE 22 C—Whenever an authorized Inspector of the State Plant Board shall find in the possession of any common carrier

in this State any shipment, article or product that is infected or infested with any insect, pest or disease, the dissemination of which under the law or rules of this Board, now or hereafter promulgated, is or shall be prohibited, such common carrier shall make no further transportation or delivery of such shipment, article or product so infected or infested, otherwise than to return the same to the shipper, to be by him dealt with or treated as the law may provide. At the time of such inspection such inspector shall deliver to such common carrier a certificate in substantially the following form:

"To.....and All Whom It May Concern:

(NAME OF CARRIER)

"This is to certify that on the.....day of.....  
19....., the undersigned inspected while in your possession at  
....., Miss., a shipment of.....

(KIND AND NATURE)

consisting of.....bundles or packages, shipped by  
.....of.....

State.....to.....at  
....., State of Miss., and found the same to  
be infected or infested with.....

(NAME OF INSECT, PEST OR DISEASE)

"And you are hereby notified that the transportation and delivery of said shipment so infected or infested, within the State of Mississippi, is prohibited by law and the Rules of the State Plant Board thereunder, except for the purpose of returning said shipment to the shipper, to be by him dealt with or treated as the law may require.

"This.....day of....., 19.....

STATE PLANT BOARD INSPECTOR."

That the said Inspector shall at the same time attach to such shipment a duplicate of said Certificate.

It shall also be the duty of said Inspector to forthwith notify the consignee and consignor, if their names and addresses be known to such Inspector, which notice shall contain in substance the information provided for in the foregoing form of certificate.

RULE 23—Has been repealed—Superseded by Rules 45 and 53 B.

## PUBLIC NOTICE!

### DECLARING CERTAIN AREAS TO BE INFESTED WITH THE SWEET POTATO WEEVIL.

In accordance with Section 14 of the Mississippi Plant Act of 1918, Chapter 219 of the laws of 1918, the State Plant Board of Mississippi does declare and give public notice thereof that the sweet potato root weevil (*Cylas formicarius*) is an insect pest, the dissemination of which should be prevented, that sweet potato

plants, vines, slips, cuttings, draws, and tubers, and morning glory (*Ipomoea sp.*) vines and roots are plants likely to become infested by said insect pest and that the following areas are within the State of Mississippi in which said insect pest is known to occur: the counties of Hancock, Harrison, and Jackson, and all of that portion of Pearl River County lying south of a line running east and west through Richardson.

RULE 24 A—The movement or shipment of sweet potatoes, sweet potato plants, vines, cuttings, slips and draws and all morning glory plants or parts of plants from the areas designated in the Public Notices of the State Plant Board as areas in which the sweet potato weevil (*Cylas formicarius Fab.*) is known to occur (such areas include the Counties of Jackson, Harrison, Hancock, and that part of Pearl River County lying south of a line drawn due east and west through the town of Richardson, and such other areas in the State of Mississippi that may hereafter become infested with the sweet potato weevil), other than the infested properties or premises covered by Rule 24 B, into or through all parts of the State of Mississippi outside of the areas specified as infested, is prohibited, except upon special permit issued by the Potato Inspection Department; which shipments must have attached to each package, bundle, parcel or container, a Certificate tag of the State Plant Board.

RULE 24 B—The movement or shipment of sweet potato plants, vines, cuttings, draws and slips and all morning glory plants or parts of plants, from properties or premises in the State of Mississippi now known to be infested with the sweet potato weevil (*Cylas formicarius Fab.*), or properties on which the weevil has been found within twelve months prior to the passage of this rule, or properties that may hereafter become infested with the sweet potato weevil is prohibited.

The movement or shipment of sweet potatoes from infested properties, or properties on which the weevil has been found within the last twelve months, or properties that may hereafter become infested in the State of Mississippi is prohibited, except for commercial purposes, which movement or shipment shall be under the direct supervision and in such manner as to avoid the danger of spreading the sweet potato weevil, as prescribed by an official Inspector of the State Plant Board or an Agent of the Bureau of Entomology, until such time as the property or premises is declared by the State Plant Board to be apparently free from weevil infestation, *Provided*, that no shipment or movement can be made to or through any point outside of the areas now known to be infested, or hereafter may become infested, in the State of Mississippi.

RULE 25—The movement of any and all host plants of cottony cushion-scale from a property on which cottony cushion-scale is known to have been present or from a property in a locality in

which cottony cushion-scale is known to have been generally distributed, is hereby prohibited, until after such plant or plants have been treated by being completely immersed in a solution containing one pound of fish oil soap, or other approved soap, to three gallons of water and all accessible parts thereof have been scrubbed with this solution under the personal supervision and direction of a duly authorized agent or inspector of the State Plant Board whose services shall be paid for in advance by the owner of such nursery stock or other host plants of the cottony cushion-scale

RULE 26—Has been repealed—Superseded by Rule 46 (A, B C and D)

RULE 27—The movement of all trees and plants commonly known as nursery stock, including budwood and scions, which do not have attached thereto a proper certificate tag, issued by the State Plant Board, and which have not been prepared for movement in accordance with the Rules and Regulations of the State Plant Board, in other respects, is hereby prohibited.

RULE 28—No certificate shall be issued for the movement of any nursery stock until such stock shall have been inspected by an Agent of the State Plant Board, and found to be apparently free from especially injurious insect pests or diseases. Should any especially injurious insect, pest or disease be found, either on the nursery stock or on the premises, no certificate shall be issued until such insect pest or disease has been suppressed to the satisfaction of the Nursery Inspector. No certificate shall be issued when the nursery stock is exposed to infestation or infection from any especially injurious insect pest or disease that occurs within one-fourth mile from where any part of said nursery stock is located; provided, however, that the nursery-man may remove such stock under the direction of the Nursery Inspector, and under such precautions as he may specify, and provided, further, that nothing in this rule shall be construed as preventing the enforcement of quarantines to a greater distance than one-fourth mile in the case of properties declared by the Board to be infested or infected with any insect pest or disease declared to be a public nuisance.

RULE 29—All shipments of nursery stock and every package thereof, transported within, into, or out of the State of Mississippi, shall be completely and securely boxed or covered to prevent infestation or infection by injurious insect pests or diseases. Carload shipments in bulk shall be in cars with openings effectually screened or closed.

RULE 30—All nursery stock, except those plants that will not stand defoliation, shall be completely defoliated, including leaf-stalks. Citrus must always be defoliated. All nursery stock shall be handled in such a manner that none of the leaves or clippings shall become mixed with any packing material.

**RULE 31**—All pecan, apple, pear, plum, and peach stock and all other host plants of San Jose Scale which will stand fumigation, shall be fumigated with hydrocyanic-acid gas immediately before being delivered for transportation. Every nurseryman shall have his fumigation box or house completed and in order, with necessary chemicals at hand, ready to demonstrate his ability to fumigate nursery stock, at the time of inspection. No certificate shall be issued until the fumigating facilities have been approved by the Nursery Inspector.

**RULE 32**—Any certificate may be revoked and all certificate tags recalled, at any time for any violation of the provisions of the Mississippi Plant Act of 1918, of the Rules and Regulations of the State Plant Board, or of the requirements of the Nursery Inspection Department.

**RULE 33**—Until further notice is given, or at the discretion of the Nursery Inspector, the plants and parts thereof listed herewith, when apparently free from injurious insect pests and diseases, need not be inspected, but may be sold, exchanged or transported without a certificate tag attached. These exceptions do not apply to any plants or parts thereof imported from foreign countries, nor from the possessions of the United States not on the mainland of North America:

Mississippi-grown forest trees and shrubs; vegetable plants and other herbaceous plants, except sweet potato plants; provided, however, that strawberry plants shall be considered as nursery stock.

**RULE 34 A**—The Nursery Inspector shall be required to have prepared and shall arrange that any person entitled thereto may secure, under such conditions as the Nursery Inspector may name, certificates in proper form and serially numbered, to be affixed to any nursery stock the movement of which is permissible under the provisions of the Mississippi Plant Act of 1918.

The Nursery Inspector shall be further required to keep in his office exact records covering the issuance of all such certificates and the movement of nursery stock for which such certificates have been used, and the persons by whom such certificates have been secured shall be required to provide the Nursery Inspector at any time and in such manner as he may designate, with the information necessary for the keeping of such records.

The Nursery Inspector shall have authority to call for the return of any unused certificates at his discretion.

The cost of printing such certificates shall be paid by the nurseryman to whom furnished.

The forms of certificates to be issued to cover the movement of nursery stock shall be as follows:

FORM No. 1

(Serial Number)

Issued....., 19.....

## MISSISSIPPI STATE PLANT BOARD

*Office of Nursery Inspector**Agricultural College, Miss.***Nursery Certificate**

The undersigned hereby certifies that the..... nursery stock, in the nurseries of..... located at....., Mississippi, has been thoroughly inspected. The stock, premises, and adjacent properties have been found to be apparently free from especially injurious insect pests and diseases. The owner has agreed to completely defoliate (when possible) and to fumigate properly with hydrocyanic-acid gas, or to otherwise treat as directed, all stock sold or moved under this certificate, as provided in the Rules and Regulations.

A complete list of plants transported under this tag with the name and address of the consignee is on file in the office of the Nursery Inspector at Agricultural College, Mississippi.

The use of this certificate tag upon nursery stock which has not been inspected by a duly appointed nursery inspector of the Plant Board is a violation of the law and will be prosecuted.

Approved:

*Entomologist.**Nursery Inspector.*

Form No. 2

(Serial Number)

Issued....., 19.....

## MISSISSIPPI STATE PLANT BOARD

*Office of Nursery Inspector**Agricultural College, Miss.***Nursery Dealer's Certificate.**

The undersigned hereby certifies that the nursery stock sold by..... of....., Mississippi, is apparently free from injurious insect pests and diseases, and that the same may be transported under the provisions of the Mississippi Plant Act of 1918.

The undersigned further declares that..... has furnished him with names and addresses of the persons from whom and the localities where he purchased or obtained the nursery stock sold under this certificate.

A complete list of the plants transported under this tag with the name and address of the consignee is on file in the

office of the Nursery Inspector at Agricultural College,  
Mississippi.

Approved:

Form No. 3 *Entomologist.* *Nursery Inspector.*  
(Serial Number)

## MISSISSIPPI STATE PLANT BOARD

Office of Nursery Inspector

*Agricultural College, Miss.*

## Package Certificate

\_\_\_\_\_, Miss., \_\_\_\_\_, 19\_\_\_\_  
This is to certify that the contents of this package from  
\_\_\_\_\_ of \_\_\_\_\_, Mississippi,  
addressed to \_\_\_\_\_ of \_\_\_\_\_, State  
of \_\_\_\_\_, have been carefully inspected and  
found to be apparently free from especially injurious insect  
pests and diseases and may be sold and transported under the  
provisions of the Mississippi Plant Act of 1918.

A complete list of the plants transported under this tag with the name and address of the consignee is on file in the office of the Nursery Inspector at Agricultural College, Mississippi.

The use of this certificate tag upon nursery stock which has not been inspected by a duly appointed nursery inspector of the Plant Board is a violation of the law and will be prosecuted.

*Inspector.*

*Nursery Inspector.*

**RULE 34 B**—Agents or salesmen representing nursery firms shall register with and obtain an agent's or salesman's certificate from the Nursery Inspector, Agricultural College, Mississippi, before selling, delivering, or taking orders for nursery stock in Mississippi. Applications by agents or salesmen for registration and a certificate shall be submitted to the Nursery Inspector, Agricultural College, Mississippi, on form letters furnished by the Nursery Inspection Department. The information asked for on this form letter shall be given and attested to by affidavit by each agent or salesman before securing a certificate.

**RULE 35**—Any person or firm desiring to ship nursery stock into Mississippi shall file with the Nursery Inspector a satisfactory certificate of inspection. They will then be privileged to purchase Permit Certificate tags from the Mississippi Nursery Inspector. One, and only one, Permit Certificate tag shall be attached to each bundle of nursery stock shipped into Mississippi. Shipments shall be prepared and tags accounted for in accordance with re-



quirements of the Nursery Inspection Department of the State Plant Board of Mississippi.

**RULE 36**—Persons or firms desiring certification of nursery stock shall file a request for inspection with the Nursery Inspector at Agricultural College, at least sixty days in advance of the date upon which they desire to move or sell such nursery stock. Persons or firms requesting certification on shorter notice may be charged with the fee covering the expenses of inspection and certification as provided for in Section 11 of the Mississippi Plant Act of 1918.

**RULE 37 A**—The importation into the State of Mississippi of any and all of the following plants, plant products and stone and quarry products, originating in that portion of the New England States defined by the United States Department of Agriculture as being territory infested with the gypsy moth (*Porthetria dispar*), is hereby prohibited, except that shipments of the things or articles herein enumerated may be admitted and permitted delivery in this State when accompanied by an inspection certificate (or permit) issued by a properly authorized agent of the United States Department of Agriculture or by the proper inspection official of the State in which such shipments originate, showing that they have been inspected, and found free from the gypsy moth and the larvae, pupae and eggs thereof, and plainly labelled with the names and addresses of both consignor and consignee.

All trees, plants, shrubs, vines, cuttings, grafts, buds, and all other trees and plants, or parts thereof, commonly known as nursery stock.

All forest, fruit and ornamental trees and shrubs and parts thereof.

Field-grown florists stock, shrubs, vines, and all other plants or parts thereof for planting or propagation, except flower or vegetable seeds.

Forest-plant products, including logs, tan bark, posts, poles, railroad ties, cordwood, lumber, box-bands, and hoops.

Coniferous trees, such as spruce, fir, hemlock, pine, juniper, cedar, and arbor vitae, known and described as Christmas trees, and parts thereof.

Decorative plants, such as holly and laurel, known and described as Christmas greens or greenery.

Stone and all other quarry products.

Shipments of any of the articles aforesaid, originating at any point within the area defined by the United States Department of Agriculture as being infested by the gypsy moth, arriving at any port or other destination in the State of Mississippi without being accompanied by the certificate of inspection herein required, shall be subject to immediate deportation upon the order of the Entomologist or his assistants; or otherwise treated as the Entomologist may direct.

RULE 37 B—The importation into the State of Mississippi of any and all of the following plants originating in that portion of the New England States defined by the United States Department of Agriculture as being territory infested with the brown-tail moth (*Euproctis chrysorrhæa*), is hereby prohibited, except that shipments of the plants and parts of plants herein enumerated may be admitted and permitted delivery in this State when accompanied by an inspection certificate (or permit) issued by a properly authorized agent of the United States Department of Agriculture or by the proper inspection official of the state in which such shipments originate, showing that they have been inspected, and found free from the brown-tail moth and all stages thereof, and plainly labeled with the names and addresses of both consignor and consignee:

All trees, plants, shrubs, vines, cuttings, grafts, buds, and all other trees and plants, or parts thereof, commonly known as nursery stock.

All forest, fruit, and ornamental trees and shrubs and parts thereof.

Field-grown florist stock, shrubs, vines, and all other plants or parts thereof for planting or propagation, except flower or vegetable seeds.

Shipments of any of the plants or parts of plants aforesaid, originating at any point within the area defined by the United States Department of Agriculture as being infested by the brown-tail moth, arriving at any port or other destination in the State of Mississippi without being accompanied by the certificate of inspection herein required, shall be subject to immediate deportation upon the order of the Entomologist or his assistants, or otherwise treated as the Entomologist may direct.

RULE 38—The introduction into the State of Mississippi through the ports thereof of plants, fruits, vegetables or other material that is likely to introduce insect pests or diseases especially injurious to the agricultural and horticultural interests of the State is hereby prohibited; provided, however, that plants, parts of plants, fruits or vegetables, the importation of which into the State has not been specifically prohibited, and which shall be found upon inspection by a properly appointed agent of the Plant Board to be apparently free from such especially injurious insect pests and diseases shall be permitted to enter the State and be transported, sold, or exchanged within the State.

RULE 39—The importation of citrus fruits, sapodillas (*Achras sapotes*), guavas, mangoes, peaches and plums into the State of Mississippi from Mexico, in which country the Morelos fruit worm or orange maggot (*Anastrepha (Trypeta) ludens*), is known to occur, is hereby prohibited and such importations arriving at any port, railway station or other place in the State of Mississippi, or found in the waters adjacent thereto, shall be subject to immediate confiscation by agents of the Plant Board.

**RULE 40**—The importation into the State of Mississippi of any and all fruits, vegetables, plants or parts of plants listed by the Plant Board as hosts of the Mediterranean fruit fly (*Ceratitis capitata*) from Africa (Cape Colony, Congo, Delagoa, Dahomey, Nigeria, Transvaal and Uganda), Argentine Republic, Australia, Azores, Bermuda, Brazil, Cape Verde Islands, Europe (Italy, France, Malta, Spain, and Sicily), Hawaiian Islands, Madeira and New Zealand, wherein the Mediterranean fruit fly is known to exist, is hereby prohibited and such importations arriving at any station, port or other place within the State of Mississippi, or found in the waters adjacent thereto, shall be subject to immediate confiscation by agents of the Plant Board, excepting that the following plant products may be admitted in the form herewith specified from the countries above listed as being those in which the Mediterranean fruit fly is known to exist:

Coffee bean, Figs (dried), Grapes, Lemons.

**RULE 41**—It shall be the duty of any common carrier, operating within the State of Mississippi, its agents or employees, to notify the Entomologist, or his duly authorized agent, immediately upon the receipt by such common carrier of any shipment of any article or thing coming under the provisions of the Plant Act of 1918 and offered to such common carrier for transportation and delivery, as to which the requirements of the Plant Act of 1918 or of any of the rules or regulations of the State Plant Board have not been complied with; and such common carrier shall not transport or deliver such illegal shipment but shall hold same safe pending instructions from the Entomologist or his duly authorized representative as to the disposition to be made of such illegal shipment.

**RULE 42**—In order to prevent the introduction into Mississippi of the very destructive insect enemy of alfalfa known as the Alfalfa Weevil (*Phytonomus posticus*) the shipment into this state of articles listed below that originated in the states of Colorado, Idaho, Nevada, Oregon, Utah, and Wyoming is hereby prohibited:

(a) Alfalfa hay and all other kinds of hays, straws, excelsior, leaves, etc.

(b) Fresh fruits and vegetables except when accompanied by an inspection certificate of a recognized State Pest Inspection Officer of the State where the shipment originated. The inspectors certify that shipments were repacked from orchard or field boxes into new clean boxes or other fresh containers; that all wagons or other conveyances used in hauling to the place where repacking was conducted were free of alfalfa hay and other hays, straw and other means of contamination; that all packing houses were at all times free of alfalfa hay and other hays, straw, and all means of contamination.

(c) All nursery stock, unless accompanied by special certificate setting forth that such nursery stock has been fumigated

for the alfalfa weevil in an airtight enclosure subsequent to being boxed, baled or packed for shipment, with cyanide of potassium or cyanide of sodium at the rate of one ounce to each one hundred cubic feet of enclosed space.

(d) All railway shipments of livestock unless shipped in cars that are free of alfalfa hay and all other hays and straws when they leave the infested states. These articles may be added in states that are free of the alfalfa weevil.

(e) That no shipment of household or emigrants' movables originating in any state designated as infested with the alfalfa weevil shall be brought into the State of Mississippi by any common carrier, person or persons, unless such shipments be accompanied by a copy of a sworn statement made in duplicate by the owner or shipper to the effect that no nursery stock, vegetables or fruit is included in the shipment and that no hay or straw is included for packing material or any other purpose, and the affidavit shall include a statement as to the articles contained in the shipment. One copy of this affidavit shall accompany the bill of lading and the other copy shall be mailed to the State Plant Board, Agricultural College, Mississippi.

**RULE 43**—Permits may be allowed to out-state nurseries to ship satsuma orange plants, kumquat plants and special or rare varieties of citrus plants into this state under the following conditions:

1. Each nursery must make application to the Nursery Inspector, Agricultural College, Mississippi, for permission to ship citrus plants into Mississippi.

2. The Nursery Inspector may issue special citrus permit tags at actual cost if after careful investigation he is convinced that it is safe to do so.

3. Under no circumstances will there be issued citrus permit tags to any nursery located within one mile of where citrus canker has ever been known to occur, or to any nursery that is located within fifteen miles of a property on which citrus canker has been known to occur at any time during the past three years, or to any nursery that has not been carefully inspected by official nursery inspectors at least three times during the previous twelve months at intervals of at least thirty days between each inspection.

4. Each nursery applying for or receiving special citrus permit tags must follow in detail all other rules and regulations covering the movement of nursery stock and co-operate fully with the Mississippi Nursery Inspector in his efforts to prevent the further introduction of serious insect pests and plant diseases.

5. Special citrus permits may be recalled or cancelled at any time when, in the opinion of the Board, the interests of the State will be safe-guarded by so doing.

**RULE 44**—The putting out of seed beds or otherwise growing sweet potato seed, plants, or parts of plants on farms infested

with sweet potato weevil is prohibited except when the seed or plants have been obtained from sources approved by the State Plant Board.

**RULE 45**—In order to prevent further distribution of the destructive insect enemy of sweet potatoes known as the sweet potato weevil (*Cylas formicarius* Fab.) the importation into Mississippi of all sweet potatoes, sweet potato plants, vines, cuttings, draws and slips, all morning glory plants and parts of plants, from the following areas which are known to be infested with the sweet potato weevil, or are areas that are considered dangerous by the State Plant Board of Mississippi, is hereby prohibited:

All Foreign Countries;

Alabama—Mobile County;

Florida—Volusia, Brevard, St. Lucie, Palm Beach, Broward, Dade, Monroe, Lee, DeSoto, Manatee, Hillsboro, Pinellas, and Baker Counties;

Georgia—Charlton County;

Texas—Entire State;

Louisiana—All parishes south of a dividing line between Mississippi and Louisiana, such line running due east and west crossing the Mississippi River at the southwest corner of Wilkinson County, Mississippi, and a line continuing from this point along the northern boundaries of Avoyelles, Rapides and Vernon Parishes to the Texas Border;

All other areas in the United States that may hereafter become infested.

**RULE 46 A**—In order to prevent the introduction into the State of Mississippi of the Pink Bollworm (*Pectinophora gossypiella*, *Saunders*), the importation of cotton lint, linters, waste, sweepings and samples into Mississippi is prohibited from all foreign countries and from the Infested and Regulated areas of Louisiana and Texas as described by the Federal Horticultural Board in Quarantine Number 46 issued July 21, 1920. (This rule agrees with the Federal quarantine so far as lint cotton is concerned.)

**RULE 46 B**—The shipment into Mississippi of cottonseed, seed cotton, and cottonseed hulls is prohibited with the following exceptions:

1. Cotton seed and seed cotton grown in states other than Texas and Louisiana, may be brought into Mississippi upon permits issued by the Chief Inspector of the State Plant Board of Mississippi.

2. Upon evidence satisfactory to the Chief Inspector of the State Plant Board that it is safe to do so, permits may be granted by the Chief Inspector for the shipment of cotton seed, seed cotton, and cotton seed hulls into the State of Mississippi from the Parishes of East Carroll, West Carroll, Catahoula, Concordia, Franklin,

Madison, Morehouse, Richland, Tensas, and all Parishes of Louisiana east of the Mississippi River.

3. Permits may be issued for the shipment of cotton seed hulls into Mississippi upon evidence that the seed were grown in states other than western Louisiana and Texas, and permits may be issued to cover shipment of hulls from western Louisiana and Texas upon evidence satisfactory to the Chief Inspector of the State Plant Board that the hulls have been treated in such manner as to remove all danger of any Pink Bollworms being present.

**RULE 46 C**—Before ACCEPTING SHIPMENTS of cotton seed, seed cotton and cotton seed hulls DESTINED for points in MISSISSIPPI, Transportation Agents will see that a PERMIT issued by the Chief Inspector of the State Plant Board of Mississippi is FURNISHED BY THE SHIPPER, and the ORIGINAL PERMIT MUST BE ATTACHED TO THE WAY-BILL and accompany the way-bill to destination. The permit must be kept on file with the way-bill by the Transportation Company.

**RULE 46 D**—The transportation through the State of Mississippi of cotton lint, linters, waste, sweepings and samples; and of seed cotton, cotton seed, cotton seed hulls, cotton ginning and milling machinery, cotton bagging and all things or materials which have been used in connection with the growing, harvesting, baling or manufacturing cotton lint or cotton seed, from the States of Texas and Louisiana, and from all other States in which the Pink Bollworm may hereafter be found to exist, is prohibited; except when transported through the State of Mississippi in freight cars, or other containers that have all cracks, doors, windows, or other openings closed, covered and sealed by the use of very heavy paper or other suitable materials, for the purpose of eliminating entirely the possibility of the escape from such cars or containers of any part of the shipment contained therein, or the escape of any insect pest with which such cars or other containers might be infested.

**RULE 47**—Special permits may be issued by the Chief Inspector of the State Plant Board for the entrance into Mississippi of any quarantined plants, seeds, or plant products that are needed for experimental purposes by the United States Department of Agriculture or by the Mississippi Experiment Station.

These special permits will be issued only after careful investigation by the Chief Inspector and only when he is assured that there is no danger in admitting the plants, seeds, or plant products in question.

**RULE 48**—It shall be the duty of the representatives of all transportation companies operating in Mississippi to notify the State Plant Board immediately upon receipt of each shipment of nursery stock, stating the name and address of the consignor,

name and address of the consignee, number of packages in shipment, and such other information as may be required by the State Entomologist.

RULE 49—In order to prevent the introduction into Mississippi of the very destructive insect pest known as the European Corn Borer (*Pyrausta nubilalis*) the shipment into this state of corn and broom corn, including all parts of the stalk, celery, green beans in the pod, beets with tops, spinach, rhubarb, oat, and rye straw as such or when used as packing, cut flowers or entire plants of chrysanthemum, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia, except the bulbs thereof without stems, from those areas of the New England and Middle Atlantic States defined by the United States Department of Agriculture as being infested now, or which shall become infested with the European Corn Borer, is hereby prohibited, except that shipments of plants or plant parts herein enumerated may be admitted and permitted delivery in this State when accompanied by an inspection certificate or permit issued by a properly authorized agent of the United States Department of Agriculture or by the proper inspection official of the State in which such shipments originate, showing that they have been inspected and found free from the European Corn Borer or any stage thereof, and plainly labeled with the names and addresses of both consignor and consignee.

Shipments of any of the articles aforesaid, originating at any point within the area defined by the United States Department of Agriculture as being infested by the European Corn Borer, arriving at any port or other destination in the State of Mississippi without being accompanied by the certificate of inspection herein required, shall be subject to immediate deportation upon the order of the Entomologist or his assistants, or otherwise treated as the Entomologist may direct.

### PUBLIC NOTICE!

In accordance with Section 14 of the Mississippi Plant Act of 1918, Chapter 219, of the Laws of 1918 (as amended 1920), the State Plant Board of Mississippi, in session on December 10, 1920, does declare and give public notice thereof that the mosaic disease is a plant disease, the dissemination of which should be prevented, that sugar cane is the plant likely to become infected with said disease, and that the following counties in the State of Mississippi are those in which mosaic disease is known to occur:

Covington	Jackson	Pike
George	Lamar	Stone
Greene	Marion	Walthall
Harrison	Pearl River	Wayne

RULE 50 A—In order to prevent the further dissemination of the disease of sugar cane known as mosaic, the movement or

shipment of sugar cane and of all other plants which may hereafter be found infected with this disease out of the counties defined in the Public Notices of the State Plant Board as being areas in which sugar cane or other plants are likely to be infected by the disease of sugar cane known as mosaic, is hereby prohibited until such time as the Plant Board shall have determined and declared that the disease has been apparently eradicated in such counties.

**RULE 50 B**—The shipment of sugar cane into Mississippi from other states and foreign countries, for any and all purposes, unless such shipments are accompanied by special permits issued by the State Plant Board of Mississippi is hereby prohibited. Permits may be issued when the shipments are known to originate in areas not known to be infected or exposed to the mosaic disease of sugar cane.

**RULE 51 A**—The shipment or movement within Mississippi or into this State from other States and countries of honey bees, queen bees, and of used or second-hand beehives, honey combs, frames and other beekeeping fixtures is hereby prohibited, except when such shipments are accompanied by a special permit issued by the Entomologist of the State Plant Board of Mississippi.

These permits will be issued when the Entomologist has sufficient evidence to assure him that there is no danger of the shipments being infected with foulbrood or other serious disease. The permit tags will be numbered and the people to whom they are issued must account for each one. All unused permit tags must be returned to the State Plant Board.

**RULE 51 B**—A quarantine is hereby placed by the State Plant Board of Mississippi on all apiaries, beeyards and colonies of bees within this State, wherein American foulbrood, European foulbrood, or other contagious or infectious diseases of honey bees is known to exist and hereafter such quarantine shall become effective upon all apiaries, beeyards, or colonies of bees wherein American foulbrood, European foulbrood, or other contagious or infectious disease is discovered. The removal of any and all colonies of bees, queen bees, nuclei and combs from such diseased and quarantined apiaries is hereby prohibited until such time as the Entomologist or his duly authorized representative shall have determined and declared that the disease is apparently eradicated from such diseased or infected apiary. The movement of beehives, frames, supers, extractors and other mechanical equipment from apiaries under quarantine as aforesaid is hereby prohibited except when such equipment is first disinfected in a manner prescribed and approved by the Entomologist.

**RULE 51 C**—The exposure by any person of hives, combs, brood or honey from colonies or apiaries which are or have been infected with American or European foulbrood or other contagious or infectious disease in such a manner as to expose other bees to



the danger of infection, is hereby prohibited and such exposure of hives, combs, brood or honey from infected colonies or apiaries shall be considered a violation of Chapter 209, Laws of Mississippi, House Bill 648, approved April 3, 1920.

**RULE 51 D**—The shipment of any extracted or strained honey from any apiary in which any contagious or infectious disease of honey bees is known to exist in any container made in part or in whole of wood is hereby prohibited.

**RULE 52 A**—In order to prevent the introduction into the State of Mississippi of the Japanese beetle (*Popillia japonica*) which insect is known to have become established in Burlington and Camden Counties, New Jersey, and in Philadelphia and Bucks Counties, Pennsylvania, the importation into the State of Mississippi from Burlington and Camden Counties, New Jersey, and from Philadelphia and Bucks Counties, Pennsylvania, of the following is hereby prohibited:

1. Farm, garden, and orchard products of all kinds, including fresh or perishable crops, such as green corn, tomatoes, beans, peas, cantaloupes, watermelons, grapes, raspberries, blackberries, cherries, peaches, apples, and all other fresh fruits and vegetables.

2. Grain and forage crops of all kinds.

3. Nursery, ornamental, greenhouse stock, and all other plants including bulbs and cut flowers.

4. Soil, compost, and manure, with the exception of fresh manure.

**RULE 52 B**—The importation into the State of Mississippi from the State of Delaware, from that portion of Pennsylvania east of the Susquehanna River other than Philadelphia and Bucks Counties, and from New Jersey, other than Burlington and Camden Counties, of nursery stock, greenhouse plants or other plants with the roots attached is prohibited, unless they have been washed free of all earth and the roots inspected immediately before shipment by an official State or Federal Government Inspector and certified as being free of all Japanese beetle larvae. Each package of plants from the above described district must have a certificate to that effect signed personally by the inspector who inspected the shipment.

The foregoing does not in any way rescind or modify the requirements that all nursery stock shipped into Mississippi shall be accompanied by the Mississippi permit certificate

**RULE 53 A**—No certificate tags shall be issued to any person or firm desiring to make shipments of sweet potato tubers for planting purposes, sweet potato plants, vines, cuttings, draws and slips from one point to another within the State of Mississippi until

the tubers, plants, vines, cuttings, draws or slips, the potato beds, storage houses or bins, fields and premises of the person desiring to make shipments have been given a thorough inspection by an Inspector of the State Plant Board, and have been found to be apparently free from the sweet potato weevil, black rot, stem rot, and other injurious insects and diseases.

The Potato Inspector may make or cause to be made as many inspections as in his discretion are necessary, and upon receipt of sufficient information to warrant the issuance of permit certificate tags, the person or firm desiring to make shipments will be notified that he is permitted to use said tags which must be purchased through the Potato Inspection Department of the State Plant Board, said tags being numbered serially and must be accounted for by invoice which must be mailed to the Potato Inspection Department immediately after such tag or tags have been used, one and only one tag must be attached conspicuously to each package, parcel or container of seed sweet potatoes, sweet potato plants or parts thereof; *Provided*, that nothing in this Rule shall be construed to prevent the shipment or movement of market potatoes from one point to another within the State of Mississippi, except as prohibited by Rule 24 A.

**RULE 53 B**—The movement or shipment into the State of Mississippi of sweet potatoes, sweet potato plants, vines, cuttings, draws and slips, and of all morning glory plants or parts of plants from points outside of the State of Mississippi is prohibited; unless such shipments have attached to each package, bundle, parcel or container a Permit Certificate tag of the Potato Inspection Department of the State Plant Board of Mississippi, such Permit Certificate must be issued according to the provisions of this rule. This rule does not apply to the areas defined in Rule 45 as being areas which are infested by the sweet potato weevil (*Cylas formicarius* Fab.), as no sweet potatoes or parts thereof will be permitted to enter Mississippi from these areas.

Any person or firm desiring to ship sweet potatoes, sweet potato plants, vines, cuttings, draws and slips, into Mississippi shall file with the Potato Inspection Department of the State Plant Board a certificate of inspection showing that the potatoes, potato bed or field, and the premises of the person desiring to make the shipment have been inspected by the State Entomologist or other duly authorized inspector of the State wherein the shipment originated, and have been found apparently free from the sweet potato weevil, black rot, stem rot, and other injurious insects and diseases.

Such person or firm will then be privileged to purchase Permit Certificate tags through the Potato Inspection Department of the State Plant Board, said tags being numbered serially and must be accounted for by invoice, which invoice must be mailed to the Potato Inspection Department immediately after such tag or tags have been used; one and only one Permit Certificate tag must be

attached to each package, parcel or container of sweet potatoes, sweet potato plants or parts thereof which shall be shipped into Mississippi.

**RULE 54**—In order to prevent the dissemination of black rot, stem rot, sweet potato weevil, and other injurious insects and diseases of the sweet potato, as defined in Public Notices of the State Plant Board, the movement or shipment from one point to another within the State of Mississippi of sweet potatoes for planting purposes, sweet potato plants, vines, draws, cuttings and slips, is hereby prohibited, unless such shipments have attached to each package, bundle, parcel or container a Certificate tag issued by the Potato Inspection Department or some other legally authorized agent of the State Plant Board of Mississippi.

**RULE 55**—Because of the presence in Alabama of the very serious insect pest known as the Mexican Bean Beetle (*Epilachna corrupta* Muls.) the quarantine regulations adopted by the Alabama State Board of Horticulture and by the Federal Horticultural Board of the United States Department of Agriculture in regard to this infestation in Alabama are hereby adopted for Mississippi.

The movement into Mississippi from the quarantined area of Alabama of all fresh beans and peas (with the exception of velvet beans, English peas and all dried beans or peas), all fresh vegetables, hay and similar forage crops, and nursery stock except when such stock and packings have been fumigated by State or Federal Authorities, is hereby prohibited.

The quarantined area is described and defined as follows:

Beginning at the Northwestern corner of Cullman County and extending Eastward on the Northern edge of Cullman County to the road leading from Cullman via Arab and Warrenton to Guntersville in Marshall County; thence following the Tennessee River Northeastward to the Tennessee State line; thence along the Alabama State line Eastward to the Georgia State line; thence Southward along the Alabama-Georgia line to the Southeastern corner of Cleburne County and including by their Eastern and Southern boundaries all of the Counties of Cleburne, Clay, Coosa and Chilton; thence from the Southwestern corner of Chilton County via the road leading Westward from Morrowville and Sprott to Marion in Perry County; thence Northwestward via the Marion and Morgan Springs road to Edith and by the Eastern boundaries of Hale County to its intersection with the Tuscaloosa County line; thence Westward and Northward along the boundaries of Tuscaloosa to the Fayette County line; thence through Hico, Fayette, Ballard and to the Marion County line near Winfield; thence along the Southern and Eastern boundaries of Marion County and the Northern boundary of Winston County to the point of beginning at the Northwestern corner of Cullman County.

**RULE 56 A**—*All hay shipments entering Mississippi must bear Permits.*—In order to prevent the introduction into Mississippi of the very destructive insect enemy of alfalfa known as the Alfalfa Leaf Weevil (*Phytomonus posticus*) the shipment into Mississippi of alfalfa hay and all other kinds of hays from all states other than Colorado, Idaho, Nevada, Oregon, Utah, and Wyoming, and from all other states which may hereafter be found to be infested with the Alfalfa Weevil, is hereby prohibited except when waybills covering such shipments are accompanied by a permit of the State Plant Board issued by the Chief Inspector.

**RULE 56 B**—*How Permits may be obtained.*—Permits may be issued by the Chief Inspector for the shipment of materials mentioned in paragraph (A) above upon satisfactory evidence that such materials were produced wholly in states other than Colorado, Idaho, Nevada, Oregon, Utah, Wyoming, and other states which may hereafter be found to be infested with the alfalfa weevil.

**RULE 56 C**—Before accepting shipments of hay destined for points in Mississippi, transportation agents will see that proper permit is surrendered by the shipper, this permit to accompany waybill to destination and be kept on file at that point by transportation agent.

**RULE 57**—The movement, handling, or disturbance of any cans of poisoned syrup put out under the direction of the Plant Board in order to control the Argentine Ant in any town, city, or county in Mississippi, is hereby prohibited, except when done by an employee of the Plant Board, or under the direction of the Plant Board.



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# THE QUARTERLY BULLETIN

OF THE 17 AUG. '22

# STATE PLANT BOARD

## OF MISSISSIPPI

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PUBLISHED BY

**STATE PLANT BOARD OF MISSISSIPPI**

AGRICULTURAL COLLEGE, MISSISSIPPI

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Entered as Second-Class Matter July 9, 1921, at the Post Office at  
Agricultural College, Mississippi, under the Act of June 3, 1900.

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Agricultural College, Miss.

## THE JAPANESE CAMPHOR SCALE IN MISSISSIPPI

By Geo. F. Arnold.

The Plant Board received reports from New Orleans in the late spring of this year which indicated that the Japanese Camphor Scale was spreading in New Orleans at an alarming rate. A severe infestation in New Orleans meant that this pest would eventually find its way to Mississippi. It is a well known fact that such serious pests as Argentine Ant, Sweet potato weevil and Cottony cushion scale have found their way into this state from New Orleans and other portions of South Louisiana. The Board decided to send a representative to investigate the danger of this scale being introduced into this State. The writer was instructed to make this visit about June 1st.

Mr. E. R. Barber of the United States Bureau of Entomology outlined the infested territory, and together we visited several scale-infested properties. Mr. Barber stated that he had found the scale on more than one hundred different host plants. The discovery was made that the camphor scale was present in a nursery and greenhouse from which plants had been purchased by another nurseryman of the city who had been shipping to Mississippi for several years past.

After the Plant Board had become acquainted with the scale situation as it existed in New Orleans, it was decided that there was a strong possibility that there was already some of the scale present in Mississippi. It could have gained admission either through shipments of nursery stock from infested nurseries or been brought in on plants by passengers on trains visiting friends in this state or returning home.

The records of nursery stock shipments from New Orleans nurserymen during the past two years were obtained from the Nursery Inspector. Over sixteen hundred shipments from five nurserymen of that city had been sent into Mississippi. These records were grouped according to towns and counties. Lists of shipments to the various sections of the State were given to inspectors in that territory with instructions to inspect the plants on the lists at their earliest opportunity. Many of these inspections were made in connection with other Plant Board work and at very little additional expense.

There was no method of determining how many plants had been brought in by passengers on trains from New Orleans nor where such plants had been planted. It is a violation of the Rules and Regulations of the Board to thus bring uncertified plants into Mississippi. As a rule, this is done by people who are not aware of the dangerous pests that may be introduced in this manner. There are many people living along the Mississippi Coast between Ocean Springs and the Louisiana line who go to New Orleans to their work each morning and return on an evening train. Some of these take much pride





FIG. 1—Japanese Camphor Scale, *Pseudaulnuxia duplex*, on Twigs from Camphor Tree Enlarged (Courtesy of Modern Farming).

in the plantings around their residences and are constantly planting out new species of plants, some of which they may bring in their hands. Also, thousands of people take excursion trips to the Coast each year. A number of these visitors have friends in the Coast towns to whom they bring a few plants. To a less degree are plants brought to this state by passengers on other railroads entering Mississippi from Southern Louisiana. Plant Board inspectors in South Mississippi were asked to be on the lookout for infestations of Camphor scale and to mail any scale for identification which might be this pest.

As a result of the inspections made of plants received during the past two years, the Camphor scale was found on three properties in our state. It was found first at Hattiesburg in July, next at Jackson in August, and at Pass Christian in October. The plan followed when the scale is found is to carefully inspect all plants on the infested property, and obtain the consent of the owner to burn infested plants. All plants on each infested property are inspected at frequent intervals for several months.

It is far more economical to take these steps to discover and eradicate the scale than to allow it to spread unchecked and later cause considerable expenditure by individuals in order to control it. It is a good illustration of "an ounce of prevention being worth more than a pound of cure." At an early date, all the shipments will have been traced and the plants examined for the Camphor scale.

Our experience with this scale has demonstrated the value—in keeping out new pests—of the system now employed requiring all nurseries selling plants in Mississippi to use numbered tags on their shipments and account for each tag used by sending a duplicate of the invoice for plants to the Plant Board. Efforts are being made by means of newspapers and otherwise to acquaint people in South Mississippi with the danger of introducing Camphor scale and other pests by bringing uninspected plants with them to their homes in Mississippi from New Orleans.



FIG 2—Trees Cut Back in an Effort to Eradicate the Japanese Camphor Scale More than 100 Different Plants are Attacked by this Pest (Courtesy of Modern Farming)

## THE CITRUS CANCER SITUATION.

By R. W. Harned.

On September 7th, 1921, Inspector Ralph P. Barnhart, while scouting for citrus canker found one grape fruit tree badly infected with the disease on the property of the Fort Bayou Fruit Company located about 10 miles Northeast of Ocean Springs, in Jackson County, Mississippi. Although the citrus canker inspectors had been searching diligently for signs of this very serious disease, not a single infected plant had been found since August, 1919, when 16 Citrus trifoliata plants were burned on the property of J. B. Gibson at Hurley in the Northern part of Jackson County. More than two years had passed without any sign of citrus canker appearing in this state.

As no canker had previously ever been found on the property of the Fort Bayou Fruit Company this infection brings our total number of properties on which citrus canker has been found up to 122. More than three years had passed since the 121st property had been added to the list. That infection also consisted of but a single tree on a Jackson County farm, the property of T. P. Roberts, Pecan, Mississippi. This tree was immediately burned and no canker has ever reappeared on this or nearby properties.

So far no one has been able to explain satisfactorily the origin of this new infection. Careful inspection has thus far failed to show any other infected plants in that vicinity. In discussing this matter, Mr. Barnhart, the inspector in charge of citrus canker eradication, emphasizes several points:

- (1). The infection was found in a vicinity which had been carefully and frequently scouted each year.
- (2). The infected tree was found two and one-half miles from the closest previous known infection.
- (3). The last citrus canker found at this point two and one-half miles away was five years ago in 1916.
- (4). The property on which this canker infected tree was found has never been even under suspicion.
- (5). Only one tree on this property was found to be infected although all others were carefully inspected.
- (6). This infection must have developed during 1921 as this particular tree was very carefully inspected during the late fall of 1920, at which time the tree was in excellent condition and heavily loaded with fruit.

There is absolutely no doubt about the tree found by Mr. Barnhart being infected with citrus canker. Diseased leaves from this tree were examined by Dr. L. E. Miles, Plant Pathologist of the State Plant Board, and Professor D. C. Neal, Plant Pathologist of the Agricultural Experiment Station.

## CROWN GALL.

By D. W. Grimes.

During the last quarter three nurseries in Mississippi were found to be seriously infected with Crown Gall (*Pseudomonas tumefaciens*). This disease is caused by bacteria and is very injurious to fruit trees and other plants. Peach trees infected with Crown Gall usually succumb to the disease in a short time, while infected apple trees may live several years and continue to bear fairly good crops but of course the production is reduced considerably due to the disease.

In the three infected nurseries, fifty-five to ninety per cent of the apple and peach trees were found to be diseased. The fruit trees in two of the infected nurseries were purchased from out-state nurseries during the past two seasons between September 1, 1919, and September 1, 1921. The proprietor of one of the two nurseries reported at the time his peach nursery was inspected this summer that he had noticed knots on the roots of his trees when they were received but had no idea it was Crown Gall. The two nurseries containing infected trees from out-state nurseries were overflowed last spring and stood in water for some time. This overflow probably assisted in spreading the disease and caused the high percentage of infection. The third infected nursery has been planted to nursery stock for about twenty years and for this reason it is not possible to trace the source of infection. However, by continually growing nursery stock for years in the same location the disease has evidently become generally distributed in the soil, accounting for the high percentage of infection.

In addition to the infected nurseries just mentioned, several specimens of Crown Gall have been sent in from home orchards that purchased fruit trees from out-state nurseries. Nurserymen as well as purchasers should always carefully examine their trees for indications of the presence of insects and diseases before planting out in nurseries or orchards. All suspicious plants should be sent to the Entomologist, Agricultural College, Mississippi, for determination.

STATE PLANT BOARD OF MISSISSIPPI



FIG 3—Crown Gall *Pseudomonas tumefaciens* on Peach Tree Buyers of Trees Should Carefully Examine Them for This Disease

## NURSERY FRAUD EXPOSED.

By Clay Lyle.

As one result of a Plant Board exhibit at a county fair this fall, information was received which enabled the Board to stop a large nursery fraud. An agent named Burnside, representing the "Tennessee Nursery Stock Dealing Company," of Chattanooga, had sold several hundreds, perhaps thousands of dollars worth of fruit trees at prices ranging from \$2.50 to \$3.00 each in Lamar County and surrounding country, on a promise to prune and spray the trees two years free of charge. The trees were to be delivered in November.

Investigation by the State Nursery Inspector showed that neither the agent nor the nursery had been certified for business in Mississippi. Further proof of the fraudulent nature of the company was added when information was received from the State Entomologist of Tennessee disclaiming any knowledge of such a nursery or company in that state.

The promoters of the fraud must have been ignorant of the strict inspection given all nursery stock entering Mississippi, otherwise they would have known that their trees, bearing no permit tags, would be held up as soon as they crossed the line, even if they could have persuaded the transportation companies to accept such shipments, which is not likely, as most of them are familiar with the requirements for shipping nursery stock into Mississippi.

The Plant Board is doing everything possible to break up such schemes and if the good citizens of this state would immediately notify the Board when such agents appear in their communities, it would be an easy matter to get rid of the pests.

## GARDEN PLANT LICE OR APHIDS.

By J. M. Langston.

In the late fall turnips, radishes, mustard, lettuce, and other garden crops are very often attacked by small soft bodied insects that are known as plant lice or aphids. They are also often found numerous on these same plants in the early spring. At other times of the year, they are usually not abundant. Their sudden appearance and disappearance cause people to think that they migrate from some other section of the country, when in fact, they remain somewhere in the vicinity during the entire year.

**LIFE HISTORY.** In the colder parts of this country, these insects pass the winter in the egg stage on some kind of trees or other hardy plants, but in our climate, they may be found in the adult stage during the whole winter, and it is doubtful if eggs are produced at all. During the warmer

months in the north, and all the year in our climate, the wingless adults produce living young in numbers. All these develop into females in a very short time. During cold weather the insects are found in small numbers around the base of plants between the leaves where they are protected from the cold and are able to survive the coldest weather we have. They do not increase very rapidly in numbers when the weather is cold, but the adults live longer, sometimes for more than a month, and since the natural enemies are few, or altogether absent, they are able to slowly increase in numbers.

When the first warm days appear, their numbers suddenly increase before the temperature is high enough to allow the natural enemies to increase to any appreciable extent. If the insects are not destroyed by artificial means, they soon kill the plants on which they are feeding. When they become crowded, winged adults are produced that fly to uninfested plants and start other colonies where the process is repeated. When the weather becomes warm enough for the natural enemies to increase the aphids are soon reduced to very small numbers. A few of them, however, are able to live through the hot summer, and start another infestation when the weather becomes cool late in the fall. They are able to pass the winter in larger numbers in our climate than the summers. Their parasites are more active in the summer than in the winter. Cold weather will reduce their numbers to a point where their damage is of no importance, but some specimens will always survive.

**CONTROL MEASURES** are always given in the form of a contact spray. Since the insects feed by sucking the juice from the plant, they cannot be killed with a poison. Clean culture will do some good as a preventive early in the season. Another measure that may be useful is to look for the first colonies that become established and destroy them, either with a spray or by destroying the plants. After the insects are well established, spraying is the best method of control. Below are given several sprays that have been used in the past. Any one of these is effective if applied carefully and thoroughly. A spray pump is essential for this purpose and it should have a spray rod with an **upturned elbow**, so that the spray can be applied to the bottom side of the leaves. If this is not done, the spray will not be effective. It may be necessary to repeat the spray about one week after the first spray.

1. **Soap Solution.** Dissolve 1 pound of soap in about 1 gallon of water (boiling), and then add water enough to make 7 gallons. Much time can be saved by shaving the soap into thin slices before putting it into the hot water.



## 2. Kerosene Emulsion.

Kerosene	2 gallons
Laundry soap	1 pound
Water	1 gallon

Dissolve soap in boiling water, remove from fire and immediately add the kerosene and pump the liquid back into itself with a spray pump until a creamy solution results, and then dilute this stock solution as follows:

For a 5% spray add 11-1 3 gallons of water to one gallon of the stock solution.

For a 7% spray add 8-1 3 gallons of water to one gallon of the stock solution.

For a 10% spray add 5-2 3 gallons of water to one gallon of the stock solution.

Try the 5% spray first, and if that seems to be too weak, try the next, etc. If the stock solution is allowed to stand a while before using, it should be examined to see if any free oil has collected on the top. In case it does, this solution should not be used as it will burn the plants

3. Nicotine Sulphate "Black leaf-40"	3 ounces
Laundry soap	1 pound
Water	25 gallons

Dissolve the soap in a small quantity of hot water, then add this to the rest of the water, then add the "Black Leaf-40" The Black Leaf-40" can be obtained from local druggists or from The Tobacco By-Products and Chemical Corporation, Louisville, Kentucky.

## 4. Home Made Tobacco Extract.

Tobacco stems or leaf tobacco are placed in enough water to cover them, and soaked over night or kept at a temperature just below boiling for an hour, but not boiled. The solution should then have the color of strong tea. Before it is used, add 10 parts of water to one part of the extract.

## KILLING CORN WEEVILS WITH CARBON BISULPHIDE.

By Clay Lyle.

Now is the time for all farmers to get out their cans of "High Life" and make war on weevils, grain moths, and other pests of stored grain. Every day's delay means greater damage to the corn, peas, or beans, as a great deal of the corn is infested with weevils before leaving the field.

By far the greatest success in fumigating is obtained in tight-walled cribs and most cribs can be made tight enough for fumigation at little expense. However, even where the walls and floor are not as tight as they should be, many farmers have had fairly satisfactory results by leveling off the corn

and covering the top with tarpaulins or wagon sheets, which prevents strong downward currents of air. More carbon bisulphide is required in such cases and near the walls many of the weevils may not be killed but the results have usually been amply satisfactory to justify the fumigation. Under such conditions it may be necessary to use not less than a quart of the liquid for each hundred cubic feet of air space. Except for the expense, there is no danger of using too much.

Fumigation should be done on a warm day as the poison vaporizes more rapidly and the weevils are more susceptible to it than on cold days. The liquid should be evenly distributed in open cans or vessels near the top of the corn. Cases are on record where the poison was placed on the floor of the crib through ignorance. Of course, no results were obtained. Cribbs should be closed for at least 48 hours and all lights kept away as the gas is very inflammable.

Shelled corn, peas, or beans in tight barrels can be easily fumigated with a teacup of bisulphide at the top of the barrel. The top should be tightly covered with thick paper or other material for confining the gas.

Carbon bisulphide can be obtained at almost any drug store. Large quantities can usually be secured at a much cheaper price, a good reason for several farmers pooling their required amounts and ordering in steel drums.

# LIST OF MISSISSIPPI CERTIFIED NURSERIES

Season 1921-1922.

Name of Nursery	Address	Kind of Stock
Aberdeen Floral Co.—		
Mrs. J. R. Young, Prop.	Aberdeen	Ornamental
J. B. Adams & Son—		
Wm. F. Adams, Mgr.	Pass Christian	General
I. E. Bass & Son Pecan Co.	Lumberton & Oc'n Spgs.	Citrus & Pecan
A. C. Ball.	Mantee	General
J. G. Barton	Booneville	General
Bay View Nursery—		
C. Forkert, Prop.	Ocean Springs	Citrus
Bechtel Pecan Nurseries—		
Theo. Bechtel, Prop.	Ocean Springs	General
V. J. Bell	Eupora, R. No. 3.	General
Mrs. Edith Biddle.	Greenwood	Ornamental
Biloxi Nursery Co.—		
Jas. Brodie, Prop.	Biloxi	General
W. L. Blackledge.	Saucier.	Pecan & Citrus
Bolen Nursery Co.—		
E. E. Bolen, Prop.	Lucedale	General
W. H. Bouslog.	Gulfport (Nsy. at Kreole).	Pecan
Bruce Nursery Company—		
R. W. Bruce, Prop.	Hermanville	General
Brown's Vineyard—		
A. C. Brown, Prop.	Waveland	Grape
Burkett Nursery Co.—		
W. L. Burkett, Prop.	Columbia	Pecan
C. E. Brown	Hattiesburg	Pear
California Orange & Pecan Ranch—		
A. B. Cox, Prop.	Helena	Citrus & Pecan
Carter Nursery Co.—		
S. P. Carter, Prop.	Hattiesburg	General
I. P. Carver.	Ocean Springs	Pecan
George Chevalier	Gulfport	Ornamental
Jackson Grape Gardens—		
Jno. J. Clark, Prop.	Jackson	Grape
W. R. Clark	Pecan	Pecan
Corinth Nurseries—		
G. W. Strickland, Prop.	Corinth	Peach
Colwood Farm—		
L. G. Lockwood, Mgr.	Hattiesburg	General
Corinth Floral Co.	Corinth	Ornamental
B. E. Cox	Perkinston	Pecan
W. A. Cox Nursery Co.	Gulfport	General
R. R. Cruthirds.	Ocean Springs	Citrus & Pecan
Dan Cunningham	Big Point.	General
Dantzler Farm Nursery—		
J. J. Jones, Prop.	Biloxi, R. No. 2	Pecan
Murphy Deloney	Ocean Springs	Citrus
Delta Nursery—		
J. E. Lewis, Prop.	Greenwood	General
O. W. Dennison.	Ocean Springs	General
Driftwood Nursery—		
Archibald Boggs, Prop.	Gulfport	General
Eastman Gardner Co.	Laurel	Ornamental
Edwards Nursery & Orchard Co.—		
J. P. Edwards, Prop.	Ocean Springs	Pecan
Carl Eckart	Ocean Springs	Pecan

Name of Nursery	Address	Kind of Stock
Eastview Nurseries—		
D Cunningham Prop	Big Point	Citrus
Fach Floral Co	Summit	Ornamental
W A Glasson	Mantee	General
Mrs R L Glass	Long Beach	General
Greenwood Floral Co—		
J W Bealle, Prop	Greenwood	Ornamental
W G Guy & Co	McComb	Ornamental
Gulf Coast Pecan Grove & Nursery—		
L B Moody, Prop	Long Beach	General
Mrs Will Halsell	Itta Bena	Ornamental
E W Halstead	Ocean Springs	Pecan & Citrus
G W Harrison	Corinth	Ornamental
Rudolph Hans	Helena	Citrus
Edd Heeckt, Florist	Pass Christian	Ornamental
Hill Crest Farm—		
E H Gifford, Prop	Biloxi	Citrus & Pecan
T A Hightower Seed Co	Hattiesburg	Ornamental
Horticultural Department—		
P B Monosmith, Mgr	Agricultural College	Ornamental
W Paul Hosier Paper Shell Pecan Co—		
B H Trotter, Mgr	Pascagoula	Pecan
W M Huntington	Pontotoc	Strawberry
August Juergens	Ridgeland	Ornamental
C E Kling	Meridian	Ornamental
L F Kramer	Pascagoula	Pecan
Kenwood Gardens—		
R E Kennington, Prop	Jackson	Ornamental
R E Langley	Jackson	Ornamental
K C Lumber Co—		
G M Luce, Prop	Lucedale	General
J G Leatherberry	Bexley	Pecan
E V McKay	Lucedale	Citrus & Pecan
A McKenzie	Laurel	Pecan
Mississippi Farms Nursery Co —		
C E Pratt, Prop	Wiggins	Pecan
Miss M E McCarter	Moss Point	Ornamental
W W McMurtray	Bentonla	Pecan
Newton Nurseries—		
J R Woodham, Prop	Newton	General
Mrs E C Newbern	Cedar Bluff	Ornamental
J D Nettles	Long Beach	Ornamental
Mrs R P Nickles	Steens	Ornamental
North Carolina Pecan Ranch—		
P F Barber, Prop	Helena	Citrus & Pecan
Ocean Springs Pecan Nursery—		
C E Pabst & Son, Props	Ocean Springs	Pecan
Oakridge Cemetery Nursery	Clarksdale	Ornamental
T G Owen & Son	Columbus	Ornamental
J Ranse Parker	Lucedale	Pecan
Carrie Jones Parker	Como	Ornamental
W E Pigford	Russell	Strawberry
Poplarville Nursery	Poplarville	General
M D Price	Biloxi, R No 2	Citrus & Pecan
W L Pack	Hattiesburg	Pecan
Mrs M W Richardson	Laurel (Nsy at Ocean Spgs)	Pecan
Rudolph & Weiss Floral & Nsy Co—		
Fred Rudolph & Fred Weiss props	Laurel	General
W P Ramsay	Ocean Springs	Pecan
R T Ramsay	Ocean Springs	Pecan

Name of Nursery	Address	Kind of Stock
The Misses Rogers	Centreville	Ornamental
S. P. Ryan	Ocean Springs	Citrus
Delmas Ryan Nurseries	Ocean Springs	Citrus & Pecan
T. J. Ryan	Hattiesburg	General
Revera Gardens—		
W. S. Marshall, Mgr.	Ocean Springs	General
T. M. Scanlan	Newton	Strawberry
Scott Nursery—		
A. C. Scott, Prop.	Hazlehurst	General
G. D. Smalley	Biloxi	Ornamental
Samuel S. Smith	Perkinston	Pear
Snell Brothers—		
F. G. Snell, Mgr.	Big Point	Citrus & Pecan
Stemme & Son	Hattiesburg	Ornamental
Mrs. O. C. Suggs	Hattiesburg	Strawberry
M. Sumedinger	Pascagoula	Citrus
Mrs. W. R. Stuart	Ocean Springs	Pecan
Stuart Pecan Ranch—		
J. C. Wright, Prop.	Ocean Springs	Pecan
Francis A. Saucier	Pascagoula	Ornamental
R. B. Thompson	Pascagoula	Pecan
Toomsaba Nurseries—		
W. C. Rogers & Son, Prop.	Toomsaba	General
Tupelo Floral Company—		
E. L. Cassell, Prop.	Tupelo	Ornamental
U. S. Nursery Co.—		
S. W. Crowell, Mgr.	Roseacres	Ornamental
VanCleave Nurseries—		
W. R. VanCleave, Prop.	Pascagoula	Citrus & Pecan
F. M. Vandergrift	Ocean Springs	Pecan
J. M. Vinson	Canton	Kudzu
H. M. Ward	Canton	Kudzu
Wilson Farm Nursery—		
Joe P. Wilson, Prop.	Landon	General
McVea Young	Pascagoula	Pecan

STATE PLANT BOARD OF MISSISSIPPI

THE QUARTERLY BULLETIN.

State Plant Board of Mississippi.

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers and other publications of a similar nature.

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R. W. HARNED, <i>Entomologist</i> .....	EDITOR
HUNTER H. KIMBALL.....	ASSOCIATE EDITOR
CLAY LYLE.....	MANAGING EDITOR

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Entered as second-class matter July 9, 1921, at the Postoffice at Agricultural College, Mississippi, under the act of June 6, 1900.

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The recent finding of a grape-fruit tree infected with citrus canker after we had begun to hope that this much dreaded disease had been completely eradicated from the state and might never again be found in Mississippi is of more than passing interest. The first reaction of this discovery upon those in charge of the work was to make them feel somewhat discouraged over the possibilities of complete eradication of citrus canker. Further thought, however, only emphasized the fact that the success so far achieved in the citrus canker eradication campaign has been little less than remarkable, and the discovery of this single infected tree has simply acted as a stimulus to all connected with the eradication of this disease in Mississippi to increase their efforts in this fight until complete eradication is assured.

The reappearance of citrus canker under the conditions described elsewhere in this bulletin emphasizes certain things that have been known for several years to those engaged in the fight against this disease: first, it is a most insidious disease and no one can predict with any degree of certainty when it may be completely eradicated from any given area; second, the organism, *Pseudomonas citri*, that causes the disease is undoubtedly able to remain alive for a long time under unfavorable conditions and again become active when conditions are favorable; third, it is absolutely essential for the future safety of the citrus industry that careful, systematic scouting be continued as a permanent insurance against the reappearance of this disease on a large scale; and fourth, that the state be protected by an effective quarantine against the introduction of the disease from other states and countries.

**PROGRESS IN SWEET POTATO WEEVIL ERADICATION.**

While the report on sweet potato weevil eradication for 1921 is not yet complete, very satisfactory progress is indicated by the fact that up to the present the weevils have been found on a total of only 20 acres of land previously uninfested, in every case the present infestation being very light.

Great progress was made during 1920 in reducing the number of infested farms, the weevils having been found on 237 farms during 1917, 1918, and 1919, of which number only 33 still had weevils at the close of 1920. Forty-two new farms were found infested in 1920 but the report for 1921 is expected to show a large reduction in this number.

**SCOUTING REPORTS.**

**July 1—September 30, 1921.**

**For Pink Bollworm.**

During the summer months there was little prospect of finding the Pink Bollworm even if it had been present, consequently very little scouting was done for this pest during the past quarter. The work will be done more extensively during the next quarter.

No. of acres cotton inspected.....	1624
No. of properties inspected.....	56
No. of man-hours.....	78

**For European Corn Borer.**

No. of acres corn inspected.....	277
No. of properties inspected.....	40
No. of man-hours.....	17

**For Mexican Bean Beetle.**

The Bean Beetle has continued to spread, chiefly northward and eastward. It is now reported only 10 miles from the Mississippi line. The following list shows inspections of peas and beans during the last quarter:

No. of acres inspected.....	836
No. of properties visited.....	271
No. of man-hours.....	264

**SWEET POTATO INSPECTION REPORT.**

During this quarter most of the field inspections of sweet potatoes to fulfill the requirements for selling seed or plants next spring were made. Properties infected to such an extent that cleaning up was impossible, will be prohibited from making sales for seed purposes. The following list gives the total of inspections made during the quarter:

No. of acres inspected.....	2485
No. of properties inspected.....	824
No. of properties found infected.....	268

**BEE DISEASE ERADICATION REPORT.**

Inspection of apiaries has been carried on during this quarter as rapidly as conditions would permit. Considerable progress in eradication has been achieved but much better results are expected next year as all the beekeepers will be familiar with the law requiring eradication and with the proper methods of eradication.

**Apiary Inspections—July 1-September 30, 1921.**

County	No. of Colonies	No. Infetd. European Foulbrood	No. Infetd. American Foulbrood
Bolivar .....	918	204	0
Coahoma .....	142	69	0
Panola .....	174	7	0
Quitman ..	250	43	33
Sharkey ..	148	16	0
Sunflower ..	415	133	4
Tallahatchie ..	131	26	0
Tunica ..	124	27	0
Washington ..	1638	80	261
Yazoo ..	99	5	0
<b>TOTAL.....</b>	<b>4039</b>	<b>610</b>	<b>298</b>



**REPORT OF NURSERY INSPECTOR.****For the Quarter Ending September 30, 1921.**

During this quarter 41 certificates were issued to agents or salesmen as required by Rule 34-B, recently adopted by the Plant Board.

Number of nurseries inspected.....	79
Acreage in nurseries inspected .....	205

**Amount of Nursery Stock Inspected:**

Grafted and budded pecans.....	249,550
Seeding pecans .....	252,900
<b>Total pecans.....</b>	<b>502,450</b>
Citrus trifoliata .....	19,300
Orange .....	15,675
Grapefruit .....	700
Miscellaneous citrus .....	1,929
<b>Total citrus .....</b>	<b>37,604</b>
Apples .....	16,815
Pear .....	11,638
Japanese persimmons .....	
Peach .....	19,850
Grape .....	2,375
Fig .....	2,710
Strawberry .....	55,000
Miscellaneous fruit .....	1,664
<b>Total fruit stock (citrus excluded).....</b>	<b>110,052</b>
Rose .....	14,505
Miscellaneous ornamentals .....	167,080
<b>Total ornamental stock.....</b>	<b>181,585</b>

**Grand total of plants inspected during quarter.....1,031,691**

**QUARANTINE INSPECTION REPORT FOR QUARTER.**

July 1 to September 30, 1921.

**Ships and Vessels Inspected:**

From foreign ports.....	12
From U. S. ports.....	2
Total.....	

**Parcels Inspected:**

Arriving by water—	
Passed .....	0
Treated and passed.....	0
Returned to shipper.....	0
Contraband destroyed .....	2
Total.....	2

## Arriving by land, express, freight, wagon, etc.—

Passed .....	394
Treated and passed.....	1
Returned to shipper.....	7
Contraband destroyed .....	1
Total.....	403

## Arriving by mail—

Passed .....	44
Treated and passed.....	2
Returned to shipper.....	0
Contraband destroyed .....	0
Total.....	46

Grand Total of Parcels Inspected ..	451
Total parcels passed.....	438
Total parcels treated and passed.....	3
Total parcels returned to shipper.....	7
Contraband destroyed .....	3
Grand Total.....	451



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# THE QUARTERLY BULLETIN

OF THE

## STATE PLANT BOARD

OF MISSISSIPPI

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PUBLISHED BY

**STATE PLANT BOARD OF MISSISSIPPI**

**Agricultural College, Mississippi**

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Entered as second-class matter July 9, 1921, at the postoffice at  
Agricultural College, Mississippi, under the Act of June 6, 1900.

#### MEMBERS OF BOARD

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**Agricultural College, Mississippi**

# Biennial Summary of Nursery Inspection Work

By D. W. Grimes

During 1920 and 1921 a total of 432 inspections of nurseries and greenhouses were made, comprising 174 separate firms or individuals. About eight million plants have been inspected during the biennium. Approximately 365 acres have been devoted to nursery stock each year. The number of nurseries has increased from 92 on January 1, 1920 to 174 at the close of 1921. Certificate tags were issued to 111 nurseries and greenhouses. Fourteen nursery dealers secured dealer's certificates. Package certificate tags were issued to 171 individuals to accompany emergency shipments.

The field inspection work for the period 1920-21 consisted of a thorough examination of each and every nursery plant in the state for insect pests and diseases. Fumigating houses and boxes were examined from time to time. Nurseries infested or infected with serious insect pests or diseases were quarantined until such pests could be eradicated. The inspector in the field assisted the nurserymen in cleaning out all infested or diseased plants, where not too severely infected or infested. Our method of inspecting each individual plant in the nurseries has reduced to the minimum the possibility of overlooking even local infestations or infections. The Plant Board has endeavored to inspect each nursery four times a year, once by the Nursery Inspector, again by our Plant Pathologist, and the other two inspections by assistant inspectors. Under our present system, the nursery inspection department of Mississippi ranks equal with that of any other state in the country, and with the exception of three or four states, surpasses most of them.

## Questionnaires

During the biennium several thousand questionnaires were sent to Mississippi purchasers of plants from out-state nurseries, regarding the condition of the plants they received. Replies to these questionnaires were numerous and very valuable as a check on unscrupulous nurserymen, dealers, and agents. As a result of these questionnaires, about 700 complaints have been taken up between various purchasers and nurseries and many adjustments have been made. Through these questionnaires also, many have received assistance in controlling serious pests.

## Agents and Salesmen

Because a number of unscrupulous agents or salesmen have operated in Mississippi for several seasons past, selling seedlings for

budded and grafted plants, collecting in advance for trees that were never delivered, and various other crooked deals, the State Plant Board adopted a regulation requiring all agents or salesmen to secure certificates from the Nursery Inspection Department before selling, delivering, or taking orders for nursery stock in Mississippi. Agent's or salesmen's certificates are issued on May 1st of each year and are valid for one year from that date. From May 1, 1921, to December 31, 1921, ninety-five of these certificates were issued. All reliable agents or salesmen are highly in favor of this ruling since it protects them by weeding out the unscrupulous ones.

#### Stunted or Unthrifty Plants

Beginning September 1, 1921, the Nursery Inspection Department has refused to inspect and certify nurseries containing unthrifty, hardened, or stunted plants. Practically all Mississippi nurseries are well-cultivated and thrifty. This new ruling protects the buyer and gives a square deal to the nurseryman who produces only high-grade plants. In order not to discriminate against Mississippi nurseries, all out-state nurseries applying for permit to do business in this state are investigated through their nursery inspection officials relative to the thrift and vigor of their plants, before certificates are issued.

#### Ornamental Herbaceous Plants

Since September 1, 1921, all ornamental herbaceous plants have been classed as nursery stock, and must be inspected and certified before they are moved or sold. Numerous complaints had been received from buyers of herbaceous ornamentals and a close inspection of the greenhouses in Mississippi revealed the fact that a number of soft plants were infested or infected with pests that should be controlled.

#### Treatment of Plants Infested With Various Pests

Nurseries are required to scrub all plants that are moved or sold if infested with purple scale, cottony cushion scale, or camphor thrips. The plants moved from such infested nurseries are scrubbed in a solution of whale oil soap, one pound to five gallons of water, under the supervision of an inspector of the Plant Board. Nurseries infested with the whitefly are required to dip their plants in the solution just named. All host plants of San Jose scale must be fumigated with hydrocyanic acid gas before they can be moved from a nursery.

#### Inspection of Foreign Shipments

A number of foreign shipments of flower bulbs were examined during 1920-1921. Several serious bulb pests were found, including the Lesser Bulb Fly (*Eumerus strigatus*), and the Narcissus Fly (*Merodon equestris*). The Lesser Bulb Fly has been known to destroy

onion crops. From hyacinths an eelworm was taken which attacks clover, lucerne, rye, oats, onions, potatoes, lime trees, and other plants, often destroying them.

#### Certificate Tags

There are three tags for the use of Mississippi nurserymen: (1) Regular, (2) Nursery Dealer, and (3) Package Certificate.

The regular certificate tags are most commonly used. One of these tags must be attached to each package of nursery stock moved from a nursery, and must be accounted for, either by the return of the tag to the office of the Nursery Inspector, or by a duplicate invoice to cover each tag used. The invoice should list the plants moved under that tag, together with the names and addresses of both consignor and consignee, and also date of shipment. By having these duplicate invoices on file, the Nursery Inspector can trace all shipments from any nursery to their destinations. The citrus canker eradication work could have been carried on with greater speed had this system been in use prior to the outbreak. Invoices from New Orleans nurseries enabled the Plant Board to promptly locate and destroy infestations of the Japanese Camphor Scale during 1921. By the use of this system in the future new pests can be prevented from gaining a foothold.

The Nursery Dealer Certificate is used by persons or firms who do not raise nursery stock themselves, but buy it from the nurseries and retail it to their customers.

The Package Certificate Tags are used in case of emergency. They are signed by the Nursery Inspector (as are other forms) and in addition are signed by the inspector of the packages on which they are placed. The Regular and Nursery Dealer Certificate Tags have no date of expiration. The tags may be recalled at any time the nursery or dealer fails to comply with the requirements of the Plant Board, or if the nursery or the plants handled by the dealer become infested or infected with any serious pest.

#### Tags Issued to Out-State Nurseries

Permit Certificate tags are sold at actual cost to out-state nurseries after they have furnished the Nursery Inspection Department with duplicate copies of the nursery inspection certificate from their state nursery inspection official, together with a fumigation affidavit to the effect that all host plants of San Jose scale will be fumigated before being shipped into Mississippi, at the same time agreeing to meet all Plant Board requirements. These certificates expire on September 1st after date of issue. The permit tag is a different color each year. One hundred and seventy-five out-state nurseries were issued permit tags during the years 1920-1921.



Special citrus certificate tags are issued only to out-state nurseries that can comply with Rule 43 adopted by the Plant Board to prevent the introduction of Citrus Canker into Mississippi. Only four nurseries were issued these tags during 1920-1921.

The number of certificate tags issued during the biennium is as follows:

Regular .....	32,364
Nursery Dealer.....	3,109
Package .....	171
Permit .....	88,385
Special Citrus.....	1,226
 Total .....	 125,255

## SUGAR CANE MOTH BORER IN MISSISSIPPI

By Foster H. Benjamin

Specimens of sugar cane infested with the Sugar Cane Moth Borer, *Diatraea saccharalis crambidoides*, Grt., were collected by Inspector E. K. Bynum during December from a farm two miles west of Biloxi and another farm four miles northwest of Biloxi. Other suspected material was sent to the laboratory by Mr. F. E. Wright, Field Assistant, Bureau of Entomology, from a farm at Ansley.

These are the first authentic records of the sugar cane moth borer infesting Mississippi cane, except for a single isolated infestation at Woodville, in the southwestern corner of the state. Unfortunately it is too late this season to make any survey of the infestations, or to attempt to control or exterminate the pest until next fall.

### Life Cycle

The eggs are round-oval, flattened and laid in clusters of from two to fifty or more on either side of the leaves of the food plant.

The larvae or caterpillars when full grown are about an inch long and an eighth of an inch wide. There are two color forms depending on the season. The summer form has a brown head, with a white body spotted with brown. In the winter form the brown spots are lost and the body assumes a dirty white appearance. The insect passes the winter in this stage.

The pupal or "resting stage" is dirty white at first but soon turns dark brown.

The adults, moths, or "candle flies" are small, inconspicuous, straw-colored with darker markings on the fore wings.

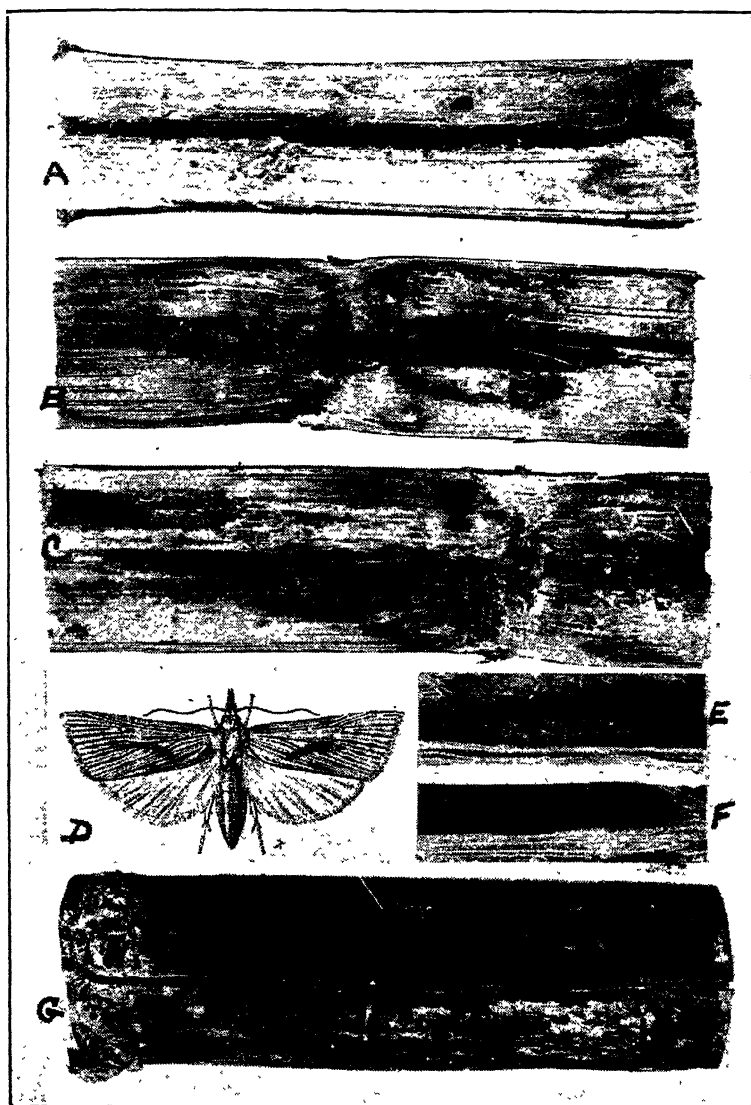


Fig. 1—The Worst Pest of Sugar Cane. Work of Sugar Cane Moth Borer, *Diatraea saccharalis crambidoides*: A, B, and C—larval tunnel inside of stalk; D—adult moth (enlarged—from U. S. Dept. of Agriculture); E—larva in burrow; F—pupa; G—larval holes in outside of stalk.

### Damage

This is probably the most destructive insect enemy of sugar cane in the United States. The sugar cane is damaged in three different ways:

1. Some of the younger shoots and stalks are killed.
2. The older cane is bored by the larvae, weakening it and causing it to be easily broken by wind.
3. There is a decided reduction in both quantity and quality of the juice produced.

Various estimates by various authors place the damage by this last item alone at up to 20% or more of the sugar. On this item alone, the loss on 300,000 acres in Louisiana for the period 1912-1917 has been estimated at \$7,287,000. Every effort will be made to prevent a similar loss to the State of Mississippi. Everyone in the State can aid by sending in all suspicious cane or insects found in cane to the Entomologist, State Plant Board, Agricultural College, Miss.

## DISINFECTION EXPERIMENTS ON SWEET POTATO PLANTS

By T. F. McGehee

These experiments were carried on at the Holly Springs Branch Experiment Station during the spring and summer of 1921. The results are published here with the hope that they may be of value to someone during the coming season.

### Experiment No. 1

On May 30th fifty sweet potato plants badly infected with Black Rot were selected from a condemned shipment. Twenty-five of these were immersed for one minute in a solution of bichloride of mercury, one ounce to eight gallons of water, and then rinsed in clean water. The other 25 plants were dipped for about one minute in clean water only. Both lots were immediately set out and watered. On June 13 all of the above plants were dead.

On the same date 50 apparently disease-free plants were selected from the same bunches as the ones used in the above test. The disease was very likely present on these plants too, but not visible. Half of these plants were dipped in the bichloride for one minute and rinsed in clean water. The other half were dipped in water only. All of them were immediately set out in dry soil and watered. On June 13 ten of the treated plants were still alive but all the others were dead.

The plants used in the above test, being taken from a condemned shipment, were somewhat wilted, so another test was conducted to

determine the effect of the same solution on fresh plants. Twenty fresh plants free of disease were selected from the beds of the Branch Experiment Station on the same date, May 30. Ten of these plants were dipped for one minute in the solution and rinsed in clean water. The other ten were dipped in clean water only for the same time. Both lots were set out in dry soil and watered. On June 13, every plant, both treated and untreated, was growing nicely.

### Experiment No. 2

On July 5, 500 disease-free plants from the beds of the Branch Experiment Station were used to test the effect of different strengths of bichloride solutions.

Two hundred of these plants were dipped in a solution of bichloride of mercury, one ounce to eight gallons of water, for one minute. Half of these were rinsed in clean water after being treated and the other half set out without rinsing.

Two hundred other plants were treated in a solution of bichloride, one ounce to twelve gallons of water, for one minute. One half of these were also rinsed in clean water after treatment and the other half set out without being rinsed.

Another hundred plants were dipped in clean water only for one minute and set out on adjoining rows to the above plants as a check. All of the 500 plants used in this test were well muddled about an hour after treatment and set in the field immediately.

On July 11, all lots were examined closely and the live plants counted. Of the plants treated in the stronger solution, 91 of those rinsed and 87 of those not rinsed were growing. Of the plants dipped in the weaker solution, 95 of those rinsed and 96 of the ones not rinsed were growing. On the check row of plants dipped in water only, 96 were growing.

### Experiment No. 3

On June 6 a test was started to determine the comparative effect of bichloride of mercury, one ounce to eight gallons of water, and formaldehyde, one pint to thirty gallons of water, on fresh sweet potato plants. Disease-free plants were used from the beds of the Branch Experiment Station. Two hundred forty plants were dipped in the bichloride and the same number immersed in the formaldehyde solution for one minute. Neither lot was rinsed after treatment. They were set out immediately in dry soil on adjacent rows and watered. The same number of untreated plants were put out on a row next to those as a check.

All of these plants were examined on the morning of June 10. The untreated plants were doing fine, but those that were treated appeared to be dead. It began raining at noon on this date and continued for two days. On June 15 they were examined again and the live plants counted. All of the treated plants had died down to the ground, but 196 of those treated with bichloride of mercury and 105 of those treated with formaldehyde had budded out again and were growing all right. Only one of the untreated plants had died and the others were growing nicely. In other words, 55.5% of those treated with bichloride, and 56.2% of the formaldehyde treated plants were dead, while only .4% of the untreated plants had died.

### Conclusions

While the number of plants used in these experiments was too small to warrant very accurate deductions, the results may prove valuable to some grower or may encourage further investigations. From the first experiment it seems likely that plants contaminated with disease spores may be saved by disinfection if the disease has not yet entered the plant. Regarding the effect of disinfection on healthy plants there is a contradiction of results in Experiments 2 and 3, as only 13% loss was shown from treated and unwashed plants in No. 2, while under the same treatment in No. 3, 55.8% of the plants died, even with such ideal growing conditions that the untreated check row showed only .4% loss. Where the buyer has good reason to believe the plants are free of disease, disinfection is undoubtedly a rather serious risk.

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CLAY LYLE.....	Managing Editor

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## RIGID SWEET POTATO INSPECTION IN 1922

In an effort to reduce to the minimum the loss caused by sweet potato diseases, the State Plant Board requirements for the sale of seed potatoes and potato plants during 1922 will be very rigid and will be strictly adhered to.

All seed must have passed a field inspection for Stem Rot, then an inspection for Black Rot in the storage house or bank before bedding. As an additional precaution, disinfection in a corrosive sublimate solution—one ounce to eight gallons of water—will be required before bedding. All growers of plants for market will have their seed inspected on the day they are bedded. One or more inspections will then be made of the plants on the bed. Buyers who purchase seed or plants that have passed these inspections may be reasonably certain of getting the very best on the market in the entire country.

To prevent these rules from discriminating against potato growers within the State, growers in other states who desire to ship into Mississippi will be required to pass the same standards of inspection, including the field inspection, bank or storage house inspection, inspection on date of bedding, disinfection, and inspection of the plants on the beds. Such rigid requirements may curtail the amount of seed and plants that would otherwise be shipped into the state, but there is no doubt that the rules give very effective insurance to the buyers of plants as well as a square deal to the Mississippi growers.

Heretofore, Mississippi growers have produced perhaps less than one-third of the potato plants sold in the state, but judging from the number of field inspections requested during the past fall there will

be a great increase in this amount during 1922. A total of 1,262 properties containing 3,742 acres were inspected. Of this number, 417 properties were found infected with Stem Rot but in most cases the infection was so light it could easily be cleaned up.



Fig. 2—Inspection for Stem Rot of Sweet Potatoes.

## BEE DISEASE ERADICATION PROGRESSES RAPIDLY

The eradication of European and American Foulbrood of bees from the counties of Bolivar, Coahoma, Quitman, Panola, Sharkey, Sunflower, Tallahatchie, Tunica, Washington and Yazoo progressed rapidly during the summer and fall months. According to the recent summarized report of J. L. E. Lauderdale, assistant entomologist in charge, 325 separate apiaries containing 3,434 colonies were inspected during the season. Most of these were reinspected making a total of 6,054 colonies.

At the first inspection 570 colonies were found infected with European Foulbrood. By the last inspection, this number had dropped to 211, a decrease of 62½ per cent. Still better results were obtained with American Foulbrood, the number of infected colonies falling from 353 at the first inspection to 53 colonies at the final inspection, a reduction of 85 per cent in the diseased colonies.



Fig 3—Bee Disease Eradication—Inspecting for Foulbrood.



Such progress is especially gratifying since the eradication work did not begin until June and many of the beekeepers did not understand the reasons for the work at first. With the better spirit of co-operation which is expected to result from a more thorough understanding of the aims of the Plant Board, it should not be impossible to stamp these diseases completely out of the state in a few years.

The following table shows the decrease in the number of colonies infected with each disease in each of the counties:

Counties	Decrease in	
	European	American
	Foulbrood	Foulbrood
Bolivar .....	197 to 102	3 to 0
Coahoma .....	68 to 31	0 to 0
*Panola .....	12 to .....	0 to 0
Quitman .....	31 to 18	26 to 11
Sharkey .....	23 to 10	0 to 0
Sunflower .....	80 to 17	3 to 0
Tallahatchie .....	24 to 10	0 to 0
Tunica .....	21 to 10	0 to 0
Washington .....	111 to 12	321 to 42
Yazoo .....	3 to 1	0 to 0
Total.....	570 to 211	353 to 53

\* No second inspection.

## EDUCATIONAL WORK EMPHASIZED

During 1921 special efforts were made to acquaint the people of the State with the destructive insects and plant diseases the Plant Board is trying to keep out of Mississippi, such as the Pink Bollworm, European Corn Borer, Mexican Bean Beetle, Alfalfa Weevil, Japanese Beetle, Citrus Canker, Camphor Scale, Gypsy Moth and other pests. Everybody was urged to be constantly on the lookout for these pests and to send in any suspicious specimens to the Plant Board for determination. These educational efforts were directed along several lines, including illustrated lectures at schools, exhibits at fairs, the distribution of posters, bulletins, and other reading matter.

Stereopticon lectures, showing insect pests and plant diseases with control measures for them, were given at more than thirty agricultural high schools over the State. Similar lectures were also given at several boys' club schools during the summer. This work will be continued during 1922 and an effort made to reach consolidated schools teaching agriculture in addition to the agricultural high schools.

As much interest was shown in the Plant Board exhibits at county fairs during 1920, this work was amplified considerably during 1921

and instructive exhibits of insects and plant diseases were shown at twenty-eight fairs and shows over the state. Competent inspectors accompanied the exhibits to answer the countless questions which were asked. Several thousand bulletins on insect pests and plant diseases were sent out in compliance with specific requests received at these fairs. A few permanent exhibits of this nature have been placed at different points in the State and others will be added as suitable public exhibit space becomes available. As the value of these exhibits at fairs is already proven, efforts will be made during 1922 to serve an even greater number of people in this way.

During the year more than 30,000 determinations of insects and plant diseases were made in the Plant Board laboratory, and in many cases the sender of the specimens received a personal letter advising control measures in addition to bulletins and circulars covering the subject.

Educational posters have been placed in many post offices, railway depots, hotel lobbies, schoolrooms, court houses, and other public places. Through timely newspaper articles, the Board has encouraged the people to look for new crop pests and assist the Plant Board in its work in various ways. All lines of educational work will be pushed during 1922 with the purpose of securing the cooperation of every citizen of the State in keeping Mississippi free from new destructive crop pests as long as possible.

### **ARGENTINE ANT CAMPAIGNS—1921**

During the past year control campaigns were conducted in seven Mississippi towns against the Argentine Ant. Four towns put on campaigns against the pest in 1920 and three of them followed up with a second drive in 1921. There was no departure from the methods used the preceding year. The poison sirup was secured from Mr. E. R. Barber of the Bureau of Entomology, at Audubon Park, New Orleans. There was considerable variation in the cost per thousand cans of poison at the different towns due to the fact that in some of the towns the cans were put up by the citizens themselves while in others hired labor was used.

The towns, dates, number of cans, and approximate cost of campaign at each place is given below:

Crystal Springs—September 14-16, 6,000 cans, \$350.

Durant—September 21-23, 2,600 cans, \$165.

Aberdeen—September 20-25, 17,000 cans, \$1,000.

Hazlehurst—October 19-24, 7,600 cans, \$590.

Columbus—October 25-27, 5,000 cans, \$396.

Gulfport—October ....., 3,000 cans, \$175.

Woodville—October 27-November 2, 6,188 cans, \$423

Jackson, Meridian, Laurel, Greenwood, Clarksdale, and several other towns were surveyed and cost estimates of control campaigns submitted. It is probable that several of these towns will fight the ant next season. The pest is now known to occur in 41 towns situated in 28 counties of the state.



Fig. 4—Argentine Ant Campaign—Nailing poison cans on trees.

## PINK BOLLWORM SCOUTING REPORT

October 1—December 31, 1921

Acres of cotton inspected	6,285
Properties inspected	368
Man-hours	702 6



Fig. 5—Looking for the Pink Bollworm.



Fig. 8—Inspecting Cotton Seed In Car for Pink Bollworm.

**REPORT OF NURSERY INSPECTOR**

For the Quarter Ending December 31, 1921

During the quarter 19 certificates were issued to agents or salesmen as required by Rule 34 B, recently adopted by the Plant Board.

Number of nurseries inspected .....	92
Acreage in nurseries inspected.....	451

**Amount of Nursery Stock Inspected:**

Grafted and budded pecans.....	50,950
Seedling pecans.....	54,415

Total Pecans..... 105,365

Citrus trifoliata.....	7,002
Orange .....	21,102
Miscellaneous citrus.....	78

Total Citrus..... 28,182

Apples .....	6,000
Pears .....	2,980
Peach .....	62,650
Grapes .....	12,685
Figs .....	265
Strawberry .....	872,500
Miscellaneous fruit.....	200

Total fruit stock (Citrus excluded)..... 947,280

Rose .....	88,906
Other ornamentals.....	645,706

Total ornamental stock..... 734,612

Grand total of plants inspected during quarter....1,815,439

**REPORT OF THE QUARANTINE DEPARTMENT FROM  
OCTOBER 1, 1921 TO DECEMBER 31, 1921**

Several important interceptions of injurious insects were made during this quarter by inspectors of the Plant Board on quarantine duty. The sweet potato weevil was found in a shipment of sweet potatoes intercepted at Gulfport. These potatoes were shipped from a point in South Louisiana to Laurel, Mississippi. This town is in an important sweet potato growing section, and is seventy-five miles north of the northern boundary of the area in Mississippi known to be infested with the weevil. Another case demonstrating the vigilance of Plant Board inspectors was the refusal to allow delivery at Tupelo of some sugar cane which had originated at Reserve, Louisiana, and was consigned to Tupelo. Examination of some of the stalks in the shipment disclosed the fact that they were infested with the sugar cane moth borer. This destructive insect enemy of sugar cane has been found in this state on only three farms in South Mississippi. If this shipment of cane had been permitted delivery, the moth borer would probably have gained a foothold in the northern section of our state. A number of insects of economic importance have been found on plants and plant products arriving by boat on the Gulf Coast. The most interesting of these insects was the larva of a moth found in a lemon from the Canary Islands. This pest is not known in this country at the present time and it may become a serious pest of citrus and other fruits if it is once introduced. Sev-

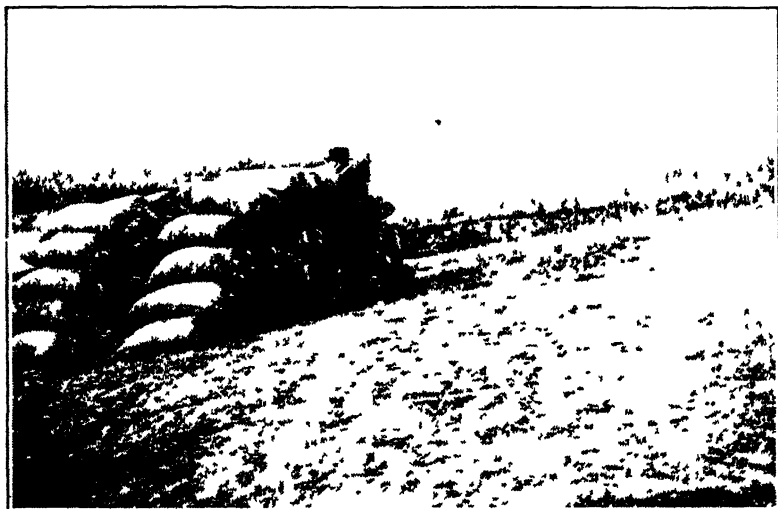


Fig. 6—Inspecting Seed Cotton at Boat Landing for Pink Bollworm.

eral species of scales were found on fruits and ornamental plants taken from boats.

A summary of the work done by the Quarantine Department for the past three months is given below:

**Ships and Vessels Inspected:**

From foreign ports.....	17
From United States ports.....	0
Total.....	17

**Parcels Inspected:**

**Arriving by Water:**

Passed .....	500
Treated and Passed .....	0
Returned to Shipper.....	0
Contraband Destroyed.....	62
Total.....	562

**Arriving by Land, Express, Freight, Wagon, etc.:**

Passed .....	2,916½
Treated and Passed .....	0
Returned to Shipper.....	18½
Contraband Destroyed .....	6
Total.....	2,941

**Arriving by Mail:**

Passed .....	313
Treated and Passed....	28
Returned to Shipper.....	1
Contraband Destroyed.....	3
Total.....	345

Grand Total of Parcels Inspected .....3,848

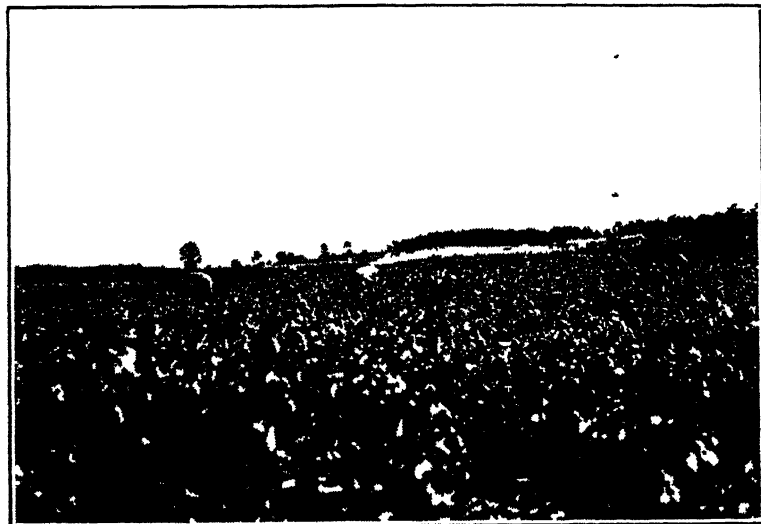
Number of parcels on hand December 31, 1921 pending determination as to final disposition.....

mination as to final disposition.....	10
Total Parcels Passed.....	3,729½
Total Parcels Treated and Passed.....	28
Total Parcels Returned to Shipper.....	19½
Contraband Destroyed.....	71

Grand Total.....3,848



**Fig. 7—Inspecting Trash Chute in Gin for Pink Bollworms.**



**Fig 9—Inspecting Soybeans for Mexican Bean Beetle.**





Fig. 10—Scouting for European Corn Borer.

### CITRUS CANKER INSPECTION REPORT FOR 1920-1921

Number of counties in the State which at one time or another since 1916 have shown canker	4
Number of counties showing canker during 1920	0
Number of grove trees inspected during 1920	89,248
Number of nursery trees inspected during 1920	345,182
Number of Citrus Trifoliata inspected during 1920	85,639
Number of counties showing canker during 1921	1
Number of grove trees inspected during 1921	74,113
Number of nursery trees inspected during 1921	291,624
Number of Citrus Trifoliata inspected during 1921	
Total number of citrus trees inspected during the Biennial Period	981,508
Total number grove trees found infected June 1, 1916 to December 31, 1921	3,087
Total number of nursery trees found infected June 1, 1916 to December 31, 1921	51,167
Number of properties infected during 1917	47
Number of properties infected during 1918	14
Number of properties infected during 1919	4
Number of properties infected during 1920	0
Number of properties infected during 1921	1
Number of new properties found infected during 1917	12
Number of new properties found infected during 1918	1
Number of new properties found infected during 1919-1920	0
Number of new properties found infected during 1921	1
Total number of properties found infected June 1, 1916 to December 31, 1921	122
Total number of properties declared no longer danger centers	121

**Insects and Diseases Intercepted During 1921 in Shipments by All  
Means of Transportation Except Parcel Post**

Insect or Disease	Occurring on	From	No. of Shipments Infested or Infected
Aonida lauri.....	Bay leaves.....	Greece.....	1
Aspidiotus Sp.....	Camellia japonica.....	Louisiana.....	1
Black rot.....	Sweet potato.....	Alabama.....	1
Black rot.....	Sweet potato.....	Florida.....	2
Black rot.....	Sweet potato.....	Georgia.....	12
Black rot.....	Sweet potato.....	Louisiana.....	4
Black rot.....	Sweet potato.....	Mississippi.....	5
Black rot.....	Sweet potato.....	Tennessee.....	17
Blight.....	Pear.....	Georgia.....	1
Citrus scab.....	Orange.....	Porto Rico.....	1
Crown gall.....	Apple.....	Georgia.....	4
Crown gall.....	Peach.....	Alabama.....	1
Crown gall.....	Peach.....	Georgia.....	4
Crown gall.....	Raspberry.....	New York.....	1
Ephestria Sp.....	Lemon.....	Canary Islands.....	1
Florinia Sp.....	Camellia japonica.....	Louisiana.....	1
Florinia theae.....	Camellia japonica.....	Georgia.....	1
Foot rot.....	Sweet potato.....	Mississippi.....	2
Hemichionaspis aspidistrae.....	Fern.....	Ohio.....	1
Latania scale.....	Ornamental.....	Tennessee.....	1
Lepidopterous larva.....	Geranium.....	Illinois.....	1
Mite (New Species).....	Sweet potato.....	Cuba.....	1
Oleander scale.....	Palm.....	Mississippi.....	1
Parlatoria Sp.....	Camellia japonica.....	Louisiana.....	1
Peach tree borer.....	Peach.....	Alabama.....	1
Peach tree borer.....	Peach.....	Georgia.....	1
Peach tree borer.....	Peach.....	Tennessee.....	3
Peach tree borer.....	Plum.....	Mississippi.....	1
Purple scale.....	Orange.....	Porto Rico.....	1
Root knot.....	Fig.....	Alabama.....	1
Root knot.....	Fig.....	Georgia.....	2
Root knot.....	Peach.....	Alabama.....	2
Root knot.....	Peach.....	Georgia.....	2
Root knot.....	Peach.....	Mississippi.....	1
Rose thrips.....	Rose.....	Mississippi.....	1
San Jose Scale.....	Apple.....	Mississippi.....	1
San Jose Scale.....	Peach.....	Mississippi.....	2
San Jose Scale.....	Plum.....	Mississippi.....	1
Scale.....	Coco plumosa.....	Louisiana.....	1
Scale.....	Lemon.....	Canary Islands.....	1
Scale.....	Rose.....	Mississippi.....	1
Scurf.....	Sweet potato.....	Mississippi.....	1
Soft rot.....	Sweet potato.....	Mississippi.....	1
Soft rot.....	Sweet potato.....	Tennessee.....	2
Stem rot.....	Sweet potato.....	Alabama.....	2
Stem rot.....	Sweet potato.....	Georgia.....	1
Stenoma anonella.....	Soursop.....	Mexico.....	1
Storage rot.....	Sweet potato.....	Alabama.....	2
Storage rot.....	Sweet potato.....	Mississippi.....	1
Sugar cane borer.....	Sugar cane.....	Louisiana.....	2
Surface rot.....	Sweet potato.....	Arkansas.....	1
Surface rot.....	Sweet potato.....	Mississippi.....	1
Surface rot.....	Sweet potato.....	Tennessee.....	2
Sweet potato weevil.....	Sweet potato.....	Cuba.....	1
Sweet potato weevil.....	Sweet potato.....	Louisiana.....	1
Termites.....	Sweet potato.....	Alabama.....	2
Woolly aphid.....	Geranium.....	Illinois.....	1

## Intercepted Mail Shipments—1921

Insect or Disease	Occurring on	From	No. of Shipments	
			Infested or	Infected
Aphids.....	Cabbage.....	Georgia.....	1	
Aphids.....	Cut flowers.....	Mississippi.....	3	
Aphids.....	Fern.....	Mississippi.....	1	
Aphids.....	Fern.....	Ohio.....	1	
Aphids.....	Geranium.....	Mississippi.....	1	
Aphids.....	Geranium.....	Pennsylvania.....	1	
Aphids.....	Lily.....	Mississippi.....	1	
Aphids.....	Lily bulbs.....	Ohio.....	1	
Aphids.....	Chrysanthemum.....	Mississippi.....	1	
Aphids.....	Chrysanthemum.....	New York.....	5	
Aphids.....	Chrysanthemum.....	Pennsylvania.....	2	
Aphids.....	Chrysanthemum.....	Tennessee.....	2	
Aphids.....	Rose.....	Illinois.....	1	
Aphids.....	Rose.....	Mississippi.....	1	
Aphids.....	Rose.....	Ohio.....	1	
Aphids.....	Rose.....	Pennsylvania.....	1	
Aphids.....	Tomato.....	Georgia.....	1	
Apple blotch.....	Apple.....	Mississippi.....	1	
Argentine ant.....	Strawberry.....	Mississippi.....	1	
Aspidiotus Sp.....	Grape.....	Oklahoma.....	1	
Aspidiotus Sp.....	Japanese persimmon.....	Mississippi.....	1	
Beetle.....	Peanuts.....	Tennessee.....	1	
Black rot.....	Sweet potato.....	Alabama.....	1	
Black rot.....	Sweet potato.....	Arkansas.....	4	
Black rot.....	Sweet potato.....	Florida.....	2	
Black rot.....	Sweet potato.....	Georgia.....	28	
Black rot.....	Sweet potato.....	Louisiana.....	2	
Black rot.....	Sweet potato.....	Mississippi.....	21	
Black rot.....	Sweet potato.....	Tennessee.....	41	
Black rot.....	Sweet potato.....	Texas.....	2	
Black rot.....	Sweet potato.....	Unknown.....	2	
Brown scale.....	Fern.....	Mississippi.....	2	
Camphor thrips.....	Camphor.....	Mississippi.....	1	
Chionaspis Sp.....	Rose.....	Unknown.....	1	
Cigar case bearer.....	Pecan scions.....	Mississippi.....	1	
Crown gall.....	Apple.....	Alabama.....	3	
Crown gall.....	Apple.....	Mississippi.....	1	
Crown gall.....	Privet.....	Mississippi.....	1	
Crown gall.....	Raspberry.....	New York.....	1	
Elatæridæ.....	Chrysanthemum.....	Michigan.....	1	
Florida red scale.....	Palm.....	Pennsylvania.....	1	
Foot rot.....	Sweet potato.....	Mississippi.....	1	
Foot rot.....	Sweet potato.....	Tennessee.....	1	
Hemichionaspis aspidistæ.....	Fern.....	New York.....	1	
Lachnosterna.....	Chrysanthemum.....	Michigan.....	1	
Leaf miner.....	Euonymus japonica.....	Pennsylvania.....	1	
Leaf spot.....	Carnation.....	Arkansas.....	1	
Leaf spot.....	Rose.....	Arkansas.....	1	
Leaf spot.....	Rose.....	Mississippi.....	1	
Leaf spot.....	Rose.....	Missouri.....	1	
Leaf spot.....	Strawberry.....	Arkansas.....	1	
Leaf spot.....	Strawberry.....	Iowa.....	2	
Leaf spot.....	Strawberry.....	Louisiana.....	1	
Leaf spot.....	Strawberry.....	Mississippi.....	4	

Insect or Disease	Occurring on	From	No. of Shipments
			Infested or Infected
Leaf spot.....	Strawberry.....	Tennessee .....	1
Leaf rollers.....	Cosmos.....	Mississippi .....	1
Lepidopterous larva.....	Flowers.....	Tennessee .....	1
Lepidopterous larva.....	Chrysanthemum.....	New York.....	1
Lepidopterous larva.....	Ornamental cuttings.....	Canada .....	1
Mealy bug.....	Begonia.....	Arkansas .....	1
Mealy bug.....	Coleus.....	Tennessee .....	1
Mealy bug.....	Flowers.....	Ohio .....	1
Mealy bug.....	Fuchsia.....	Iowa .....	1
Mealy bug.....	Lily.....	Mississippi .....	1
Mealy bug.....	Oleander.....	Ohio .....	1
Mealy bug.....	Palm.....	New York.....	1
Mealy bug.....	Rose.....	Arkansas .....	1
Mildew.....	Rose.....	Arkansas .....	1
Mildew.....	Rose.....	Ohio .....	2
Orthoptera eggs.....	Begonia.....	Mississippi .....	1
Orthoptera eggs.....	Hydrangea.....	Ohio .....	1
Orthoptera eggs.....	Grape.....	Kentucky .....	1
Pea weevil.....	Seed mixture.....	Michigan .....	1
Peach scab.....	Peach.....	Alabama .....	1
Peach scab.....	Peach.....	Mississippi .....	1
Plant disease.....	Palm.....	Pennsylvania .....	1
Pleoma (Aciculis).....	Rose.....	Mississippi .....	1
Purple scale.....	Satsuma trees.....	Louisiana .....	1
Purple scale.....	Citrus trees.....	Mississippi .....	1
Putnam scale.....	Peach.....	Mississippi .....	1
Root knot.....	Apple.....	Mississippi .....	1
Root knot.....	Fig.....	Alabama .....	1
Root knot.....	Fig.....	Louisiana .....	3
Root knot.....	Fig.....	Mississippi .....	3
Root knot.....	Flower bulbs.....	Pennsylvania .....	1
Root knot.....	Peach.....	Mississippi .....	1
Rose scale.....	Raspberry.....	Mississippi .....	1
Rose scale.....	Raspberry.....	Tennessee .....	1
Rose thrips.....	Flowers.....	Oklahoma .....	1
San Jose Scale.....	Apple.....	Michigan .....	1
San Jose Scale.....	Apple.....	Mississippi .....	2
San Jose Scale.....	Citrus trees.....	Mississippi .....	1
San Jose Scale.....	Fig.....	Mississippi .....	1
San Jose Scale.....	Japanese quince.....	Mississippi .....	1
San Jose Scale.....	Peach.....	Louisiana .....	1
San Jose Scale.....	Peach.....	Mississippi .....	3
San Jose Scale.....	Peach.....	Unknown .....	1
San Jose Scale.....	Rose.....	Louisiana .....	1
San Jose Scale.....	Rose.....	Mississippi .....	2
Scale.....	Scuppernong.....	Unknown .....	1
Scale.....	Fern.....	Georgia .....	1
Scale.....	Grape.....	Tennessee .....	1
Scale (2 Species).....	Oleander.....	Louisiana .....	1
Soft Brown Scale.....	Citrus trifoliata.....	Mississippi .....	1
Stem rot.....	Sweet potato.....	Georgia .....	2
Stem rot.....	Sweet potato.....	Mississippi .....	1
Termites.....	Rose.....	Mississippi .....	1
Thrips.....	Cut flowers.....	Mississippi .....	2
Tineid larva.....	Hemlock.....	Vermont .....	1
Tortoise beetle.....	Sweet potato.....	Alabama .....	1

Insects or Diseases	Occurring on	From	No. of Shipments
			Infested or Infected
Tortoise beetle.....	Sweet potato.....	Mississippi .....	1
Tree cricket eggs.....	Rose.....	Ohio .....	1
Wooly apple aphid.....	Apple.....	Alabama .....	1
White fly.....	Cape jessamine.....	Mississippi .....	6
White fly.....	Fuchsia.....	Iowa .....	1
White fly.....	Ornamental plant.....	Mississippi .....	1

## Quarantine Inspection Report for 1921

## Ships and Vessels Inspected:

From Foreign Ports.....	75
From United States Ports.....	6
Total.....	81

## Parcels Inspected:

## Arriving by Water:

Passed .....	508
Treated and Passed.....	0
Returned to Shipper.....	4
Contraband Destroyed.....	70
Total.....	582

## Arriving by Land, Express, Freight, Wagon, etc.:

Passed .....	9,008½
Treated and Passed.....	5
Returned to Shipper.....	505½
Contraband Destroyed.....	96
Total.....	9,615

## Arriving by Mail:

Passed .....	1,248½
Treated and Passed.....	67
Returned to Shipper.....	15
Contraband Destroyed.....	109½
Total.....	1,440

Grand Total of Parcels Inspected.....11,637

Number of parcels on hand December 31, 1921 pending determination as to final disposition.....

Total Parcels Passed.....	10,765
Total Parcels Treated and Passed.....	72
Total Parcels Returned to Shipper.....	524½
Contraband Destroyed.....	275½

Grand Total.....11,637

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THE QUARTERLY BULLETIN  
— OF THE —  
STATE PLANT BOARD  
OF MISSISSIPPI

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PUBLISHED BY

STATE PLANT BOARD OF MISSISSIPPI

A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

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**R. W. HARNED, Secretary**-----**Entomologist**  
**A. & M. College, Mississippi**

# Recent Developments in Relation to the Pink Bollworm Situation in the United States

By W. D. Hunter, Member Federal Horticultural Board

Read before the annual meeting of the Mississippi Cotton Seed Crushers' Association, at Gulfport, Miss., July 6-7, 1922.

The Mississippi Cotton Seed Crushers Association has shown a very commendable spirit in the work of the Federal Government and of the State of Mississippi against the pink bollworm. Representatives of the association have attended all of the principal conferences and their influence has been a very important factor in crystalizing public sentiment throughout the South and in bringing about suitable legislation in Texas and Louisiana. The at least fairly satisfactory situation about the pest is due very largely to the interest and activity of outside organizations, among the principal of which has been the Mississippi Crushers Association.

The present statement is prepared at the suggestion of Prof. R. W. Harned. It deals in a very brief way with some of the more important features of the pink bollworm situation which have developed in the last twelve months.

One of the most favorable features of the year has been the enactment of a new pink bollworm law in Texas. This was the fourth pink bollworm statute enacted in the state. The difficulties in obtaining sufficient and drastic legislation were great on account of constitutional provisions and on account of the opposition in some quarters. The present law which is much more far reaching than any of those passed previously, makes an unequivocal statement as to the policy and determination of the state in stamping out the pest and provides appropriate machinery.

## Status of Old Infestations

The scouting work was continued throughout the state of Texas and especially at points where infestation had been found previously. It will be recalled that the original infestation in the state was found at Hearne. The operation of a non-cotton zone for three years appears to have stamped out the pest altogether. No infestation has been found since the original cleanup work in 1917.



A remarkable decrease in the infestation was found in the Trinity Bay area comprising seven counties in the southeastern corner of the state. In 1917, several hundred fields were found infested. In 1921 a very large amount of scouting disclosed only one single specimen of the pink bollworm in all of these counties.

In the western portion of Texas, namely, in El Paso, Ward and Reeves counties and in certain counties of New Mexico, the infestation was approximately the same as during 1920.

### New Infestations

During the fall of 1921 two new infestations by the pink bollworm were found in Texas, one of these was in Ellis county and the other in Grayson. In both cases the infestation originated with seed which were shipped from Carlsbad, New Mexico, prior to the finding of infestation at that place. An examination of the records showed that many lots of Carlsbad seed had been shipped to various points in Texas and to some other states, including Oklahoma and Arkansas. For several months the most intensive form of scouting was conducted at all of the points which had received Carlsbad seed. The two infestations in Ellis and Grayson counties were the only ones discovered and it is now fairly certain that no other colonies have been established through the shipment of New Mexican seed. The situation is, therefore, much more hopeful than it was at the time of the discovery of the insect in small numbers in Ellis and Grayson counties.

The new feature of the situation arising from the finding of the pink bollworm in two counties in North Texas was considered fully at a general meeting held in Dallas on December 3, 1921, which was attended by representatives of the Mississippi Crushers Association. After an extended discussion of all features of the problem, it was decided unanimously that the effort to eradicate the pink bollworm should not be abandoned. It was considered by all present that the two infestations in North Texas were exactly comparable to the one found in 1917 at Hearne which infestation has now been eradicated.

The State of Texas operating under the new law has established small non-cotton zones in North Texas at each of the points where infestation was found. These zones are surrounded by much larger zones in which the growing of cotton and the marketing and handling of the crop are carried out under supervision. There is, therefore, no danger of spread of the pest from these two centers.

### Situation in Western Texas

At the present time there are about 40,000 acres of cotton in Western Texas and New Mexico in which infestation by the pink bollworm has been found. These areas are separated from the main cotton belt

by several hundred miles of arid territory. Each of the areas has been placed under regulations which include the disinfection of the seed by heating during the process of ginning. This measure, together with the isolation, greatly reduces the danger of the spread of the insect from the western areas. These areas are under general quarantine, which prohibits or restricts the movement of cotton and cotton products, as well as farm products in general, which could by any possibility carry infestation.

The only known method of stamping out the infestation in the West is to establish non-cotton zones. It has been shown that such zones can not be maintained except on the basis of compensation to the farmers for the losses incurred by reason of the prohibition against the planting of cotton. At the present time the amount of money which would be involved in compensation is so great that it is not considered by the state authorities in Texas and New Mexico to be feasible to undertake eradication. While this is unfortunate, the importance of strict regulations and quarantines is understood and the western infestations probably do not carry any greater danger to the United States than the present situation in Mexico. There are means of holding the pest in subjection in this country which do not occur in Mexico.

The subject of eradication in the western areas must be considered in connection with eradication in Mexico. This is being studied by representatives of the Department and a special representative of the Mexican government has been in Texas for some months obtaining data for use in a possible campaign of eradication in that country. In this way, plans are being made to take up simultaneously eradication in western Texas and Mexico whenever the circumstances are favorable.

#### Situation in Louisiana

At the time of the original discovery of infestation in southwestern Louisiana, regulated zones were established at Shreveport, Alexandria, Broussard, Gretna and Eunice, each of which points received seed from the infested territory. During the season of 1921 it was possible to release from quarantine Alexandria, Broussard, Gretna and Eunice for the reason that during two seasons of scouting no infestation was found.

In 1921 a non-cotton zone was established at Shreveport and surrounded by a large regulated zone. The work of administering these two zones was carried out satisfactorily by the State and Federal authorities and there is every indication that this will result in the eradication of the pest.

In southwestern Louisiana including Cameron, Calcasieu and Jefferson Davis parishes, non-cotton zones were maintained for two

years ending with 1921. The work was done with great thoroughness. It was decided to allow the planting of cotton in this area during 1922, thus providing an experiment to determine whether a two-year non-cotton zone will eradicate the pink bollworm. In view of the large expense incurred in maintaining non-cotton zones, the possible reduction of the period from three to two years will be a very important matter. It is understood that if infestation is found in this section in the crop of 1922 a non-cotton zone will be established again and continued for three years.

### Federal Compensation Measure

As the result of a conference which was held in Washington in April, 1921, Congress granted authority to the Department of Agriculture to participate with the states in the payment of compensation allowed to farmers in non-cotton zones. The measure provides that when non-cotton zones are established and maintained to the satisfaction of the Secretary of Agriculture, the states may be reimbursed by the Federal Government for a portion of the money paid out in the form of compensation to farmers. The amount to be paid by the Federal Government is not to exceed one-third of the actual loss suffered by the farmers and in no case to exceed \$5.00 per acre. Acting under this provision the Federal Government has reimbursed the state of Louisiana to the extent of about \$40,000 on account of non-cotton zones maintained during 1921.

\* \* \* \* \*

## A NEW POTATO WEEVIL IN MISSISSIPPI\*

By R. W. Harned

On March 28, 1922, F. W. McHenry of McHenry, Stone county, Mississippi, mailed to E. K. Bynum, inspector for the State Plant Board, Gulfport, a number of weevils accompanied by a postal card stating that the insects had been taken from Irish potato plants and that they were destroying Irish potatoes, tomatoes and turnips. Mr. Bynum did not recognize the insects and forwarded them to the Entomology Department of the State Plant Board at A. & M. College, Mississippi. The weevils were not recognized, and on April 3, 1922, were mailed by Mr. J. M. Langston to Dr. L. O. Howard, chief of the Bureau of Entomology, Washington, D. C. At the same time the correspondent was advised to use arsenate of lead on his infested plants. On

\*No name is used in this short article regarding the weevil, previously unknown in the United States, because Dr. L. O. Howard, chief of the Bureau of Entomology, informs us that there is still some difference of opinion among coleopterists as to the exact identity of this insect. One opinion is that it is probably a South American species belonging to the genus *Listroderes* or *Listronotus*, while another is that it is the Australian species, *Desiantha nociva*.

April 7th a telegram was received from Dr. Howard stating that this weevil was, probably, the South American species, *Listronotus bimaculatus*.

K. L. Cockerham of the Bureau of Entomology, E. K. Bynum, Kimble Harmon and C. H. Brannon of the Mississippi Plant Board reached McHenry on April 8th, and immediately began to investigate this new weevil. Before they reached McHenry the owner of the infested garden, Mr. W. D. Ashley, had applied arsenate of lead very thoroughly to his plants as Mr. Langston had suggested. He stated that the weevils had been very numerous at the time the first specimens were collected, but that the arsenate of lead gave almost perfect control, and that the next day after it had been used, many dead weevils were found on the ground under the plants. From Mr. Ashley's description of the work of this insect, it causes very serious damage when not brought under control, but is very easily controlled by the same methods generally used against the Colorado Potato Beetles.

On April 8th no serious damage by the weevil was found. A few weevils were found hiding just below the surface of the soil in the garden, where they had been reported very numerous two weeks earlier, but which had been sprayed twice with arsenate of lead. The weevils were found under clods and grass beneath Irish potatoes and turnips. One was found under an English pea vine, but there was nothing to indicate that it had been feeding on this plant. No weevils were found in other gardens near the infested property.

With the aid of flashlights on the night of April 10th, a number of weevils were found feeding on the plants. One man found 25 weevils in half an hour on the Ashley property. They were found on the plants just after twilight and 50 weevils were collected from two rows in about one hour, where none had been found on the plants during the day.

By April 13th six properties in McHenry had been found to be infested, some of them a quarter of a mile from the original infestation on the Ashley property. No signs of injury to the host plants could be noticed on these new properties. Only one weevil was found on each of three properties—and no more could be found even at night with the aid of flashlights. On the 13th two weevils were found on Irish potatoes in the Ashley garden as late as 8:30 a. m. They appeared to be inactive at that time and there was nothing to indicate that they were feeding.

On April 18th one weevil of this species was collected on a property five miles east of McHenry by a woman who had read a newspaper article in regard to this new weevil and had then found one in her garden; but Mr. Bynum and Mr. Brannon were unable to find any of the weevils on this property in a three-hour search.

By April 22nd an infested property had been found about two miles

north of Lyman, and another about one mile south of Saucier. At each of these places three weevils were found in a few minutes, but on other properties around Lyman and Landon no weevils were found.

On May 1, Dr. L. O. Howard wrote that some of the coleopterists in Washington had decided that the new weevil might be the Australian species, *Desiantha nociva*.

**HABITS.** The weevils sulk and drop from the plants quickly when the plants are disturbed. They crawl slowly on the ground and are rather clumsy. In jars the weevils ate from the edges of the leaves and also ate holes in the leaves. They ate leaf veins and leaf stems, severing them in places. During the night the weevils feed freely and have been observed feeding as late as 6:00 a. m. In jars they will also feed on cabbage and lettuce.

Apparently the weevils are not attracted to lights at night. So far they have not been observed to fly. Most of the observations made in regard to this weevil have been made by E. K. Bynum, assisted by C. H. Brannon and others. They have also done most of the scouting for it.

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## THE CHRYSANTHEMUM GALL MIDGE

By D. W. Grimes

Specimens of chrysanthemums severely infested with the Chrysanthemum Gall Midge, *Diarthronomyia hypogaea*, Loen, were recently received from two greenhouses in Mississippi. In both cases the plants had been purchased originally from firms in Illinois. This is the first recorded occurrence of this pest in Mississippi. A few days later five infested shipments from Pennsylvania were intercepted.

The Chrysanthemum Gall Midge is considered the most serious pest of the chrysanthemum. It is primarily a greenhouse pest, though hardy outdoor chrysanthemum plants are also attacked. This pest occurs in the larger chrysanthemum-growing regions of the United States, which includes the area surrounding the Great Lakes, the New England and Middle Atlantic States, and in Georgia, Tennessee, California and Oregon.

In the adult stage the midge is a fragile fly 1/14 of an inch long. The abdomen of the male is yellowish orange, while that of the female is reddish orange. The adult, on emerging, leaves its pupal skin protruding from the opening of the empty gall. These galls occur on the leaves, stems, or flower heads of the plant. After hatching from the orange-colored eggs deposited on the surface of the tender tips and new growth, the larvæ bore their way into the tissues, thereby giving rise to the galls. The galls are cone-shaped and about 1/12 of

an inch long. On leaves, the galls usually appear on the upper surfaces.

All chrysanthemum plants, or cuttings, exchanged between growers of chrysanthemums should be inspected carefully before being brought into commercial houses where these plants are grown. As a further precaution the chrysanthemum plants or cuttings should be dipped in, or sprayed, with a solution made as follows:

Dissolve 1 ounce of soap in 1 gallon of water and add to this a teaspoonful of 40% nicotine sulphate (Black Leaf 40). This treatment should be applied every four or five days for about two months or until no more new galls can be found. Trimming the plants to the ground in the spring has been recommended. "Black-Leaf 40" can be obtained from druggists, or from the manufacturers, The Tobacco By-Products and Chemical Corporation, Louisville, Kentucky.

As the Gall Midge attacks outdoor chrysanthemum plants as well, all growers of chrysanthemums whether using greenhouses or not, are urged to send specimens of suspicious looking plants to the State Plant Board for determination.

## FIRE BLIGHT OF APPLE AND PEAR

By L. E. Miles, Plant Pathologist

One of the most serious diseases of apples and pears in Mississippi is fire-blight. It is also known by other names, as pear blight, apple blight, blossom blight, twig blight, fruit blight, canker, and collar blight, according to the tree or part attacked. It often kills trees entirely or causes their vitality to be so lowered that they are years in recovering their former productivity.

The disease is caused by a bacterium which enters the host tree through the nectaries of the blossoms, or through wounds in the young twigs made by insects, or through mechanical injuries of other sorts in the body of the tree. The greater part of the injury occurs in the spring and early summer, due to the soft, succulent condition of the twigs and young wood, which allows rapid multiplication and advance of the causative organism. At this time the bacteria work rapidly down the twigs, spurs, or shoots, into the larger limbs or trunks where cankers are formed. These cankers are very important, because it is at their edges, where complete dying out of the tissue does not occur, that the organism remains alive and is able to survive the winter. In the spring when the sap begins to flow, the few which are still alive multiply rapidly, come to the surface through lenticels or cracks in the bark, and are ready to spread the infection.

The disease may be recognized by its various and striking symptoms. In the spring, brown blossoms accompanied by the withering

and blackening of the young fruit and fruit spurs may be observed. During the periods of rainy weather there is often a sweetish, sticky, milk-white or yellowish ooze coming from these freshly blighted parts, or from the cankers on the main limbs or the body of the tree. This ooze, composed of innumerable bacteria, attracts insects and is thereby instrumental in obtaining widespread and rapid distribution of the disease germs. The black or brown withered leaves which remain on the tree for some time serve to indicate the location of blighted parts.

The cankers on the larger limbs and trunks are usually slightly sunken and blackened. The bark along their edges, between the diseased and healthy wood, is often rough and cracked. Such cankers usually occur at points where the organism has traveled down a small twig, a sucker, or a fruit spur. This is the canker-blight, or as sometimes known, the "hold-over" blight.

Fire blight is one of the most difficult orchard diseases to control. Pruning, diligently and properly done, is the only direct means of dealing with it. However, if not properly followed up, a single pruning operation may do more harm than good. Sprays have no effect on the blight except as they may decrease the number of insects which aid in the distribution of the bacteria.

Control measures may be summarized as follows:

(1) Cut out thoroughly all hold-over cankers found on the limbs and bodies of the trees. This should be done during the dormant period, preferably in the fall while the leaves are still on the trees, as they aid in locating such cankers. Smaller branches should be cut out from a foot to 18 inches below the lowest sign of the disease. In larger branches or in the trunk, the diseased area may be removed by cutting out all the dead wood and bark well into the bright, clean tissue, leaving the wound smooth. Use a sharp knife and make the lower part of the cut V-shaped to allow good drainage as this facilitates healing. Make repeated inspections to see that all cankers are removed.

(2) Disinfect the wounds described above with a solution of corrosive sublimate (one ounce to eight gallons of water). Keep this solution in wooden, glass, or porcelain vessels as it reacts with metals and rapidly loses its strength when kept in metal containers. It is a deadly poison and should be kept away from animals and children. After the wounds are dry they should be painted with a good lead and oil paint.

(3) During the growing season the orchard should be inspected each week and every blighted twig, sucker, or spur pruned out, cutting at least a foot below the lowest sign of the disease. After making each cut, disinfect the pruning instrument by wiping on a clean cloth moistened with the corrosive sublimate solution described above. Burn the blighted material promptly after removal. All suckers and

water sprouts on the large limbs and trunks should be removed, since they are especially susceptible and often allow the entrance of the organism in such a manner as to form hold-over cankers.

(4) Avoid forcing sappy wood growth by too frequent cultivation or too heavy application of fertilizers. See that the trees are not too close together, as close planting retains the soil moisture, favors rapid growth, and thus is conducive to blight. It is advisable to plant the orchard to a sod and to do everything possible to promote a slow growth, as this insures a hard wood, difficult for the blight organism to penetrate.

(5) Co-operation with neighbors should be secured if possible as the disease is carried for considerable distances by insects. In addition to the apples and pears, watch the quinces, haws, wild crabs, and related plants in the vicinity, as they are susceptible and may serve as a means for holding over the disease germs.

There is considerable difference in the degree of susceptibility among different varieties. Of pears, the Sand pear is practically immune, with the Keiffer and Duchess relatively resistant, while the Bartlett, Clapp, and LeConte are usually very susceptible. Among apples, Starr, Smith, Cider, Yellow Transparent, and various crab varieties are very susceptible. The Ben Davis, Winesap, Mammoth Black Twig, and White Winter Pearmain are mentioned among the less susceptible varieties.

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## A NEW SUGAR CANE BORER

By R. W. Harned

During the last three days of May, T. E. Holloway of the United States Bureau of Entomology and E. K. Bynum of the State Plant Board were scouting in sugar cane fields in Harrison county to determine the extent of the infestation by the sugar cane moth borer, *Diatraea saccharalis crambidoides*, Grt., when they discovered the presence of what is apparently a new sugar cane moth borer. So far none of these new borers in breeding cages have reached the adult stage. This new borer has a striking pink coloration and Mr. Holloway, who has been working with sugar cane insects for many years, believes that this may be a new pest to sugar cane in this country. It has not been noticed in sugar cane fields in Louisiana. Specimens of the larvæ sent by Mr. Holloway to Washington were determined by Mr. Heinrich of the National Museum as belonging to the family Noctuidæ. It is apparently a voracious feeder and if abundant might easily become a very serious pest. It is hoped that before the summer is over this new pest will be definitely determined.

In this number of the Quarterly Bulletin there appears for the first time a report by E. K. Bynum in regard to the inspection of sugar cane for the moth-borers. It will be noticed that so far this new or



undetermined borer has been found only on five properties in Harrison county.

The Bureau of Entomology of the United States Department of Agriculture is co-operating with the Plant Board in making a preliminary investigation of this insect. Life history studies are being made at Gulfport and scouting is being done in at least six of the southernmost counties of the state.

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## ARGENTINE ANT INFESTATIONS INCREASE

By M. R. Smith

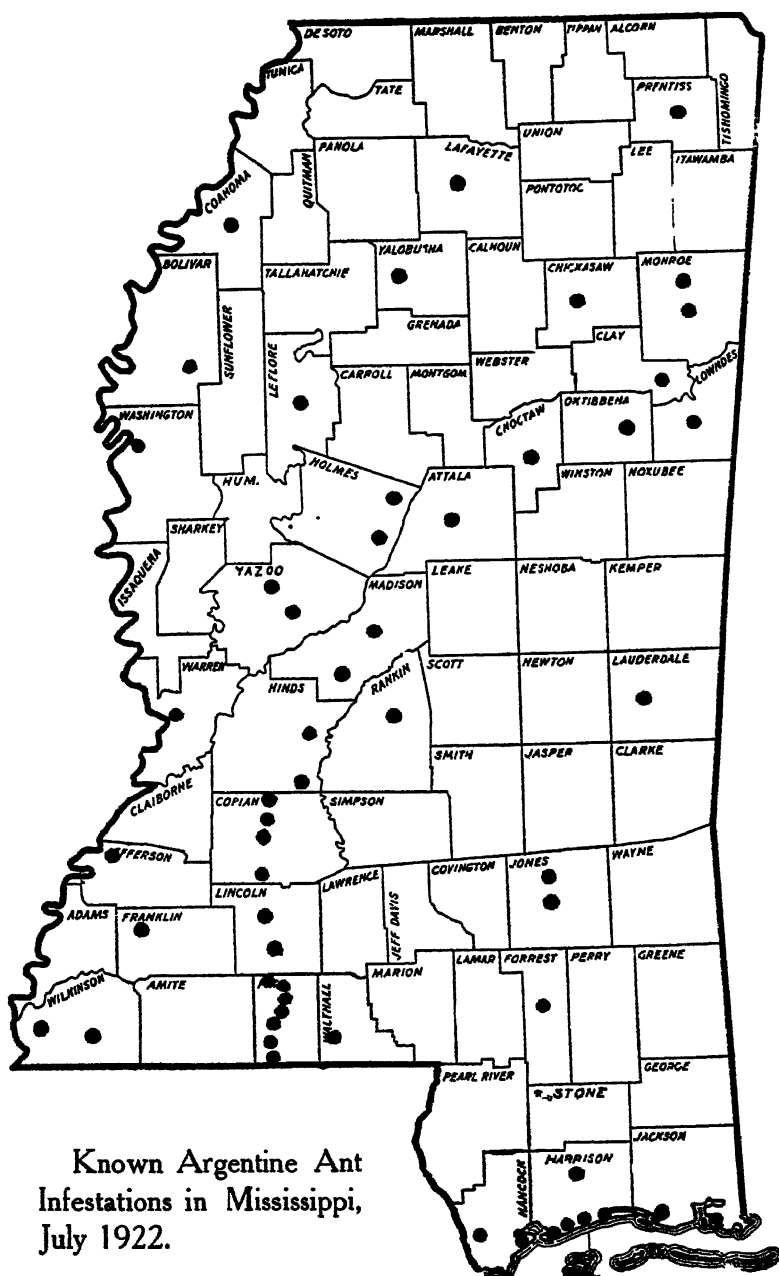
At the present time, 56 towns in Mississippi are known to be infested with Argentine ants and there are doubtless many other infestations of which the Plant Board has no record. These towns are located in 32 counties well-distributed over the state. It is interesting to note in the accompanying map how the ant infestations have followed the railroad lines, especially the main line of the Illinois Central and its branch from Durant to Aberdeen.

The infestation in some towns is very heavy, extending over the entire town and for some distance into the country. In other towns only a few blocks are infested, while in still others no survey has been made and the extent of the infestation is unknown. In any case, if the ants are allowed to increase unchecked they will soon spread over a town and into the country, making it very difficult and expensive to control them. The ideal way to control them is to poison before they have covered much territory and while the expense is small.

Most people who have had any experience with the Argentine ant realize that it is one of the worst house pests known, but few are aware of the fact that the ants are a source of danger to their fruit and shade trees and ornamental plants through their habit of distributing and protecting scale insects and plant lice, pests which sap the very life of plants and destroy them if not checked.

The list of infested towns to date is given below. These towns should attempt to control the ant by poisoning campaigns. If ants are numerous and troublesome in any town not named in the following list specimens should be sent to the Plant Board for determination. The Plant Board is ready to render any possible service in putting on the control campaigns.

Infested towns are: Aberdeen, Ackerman, Amory, Benton, Biloxi, Brookhaven, Booneville, Bay St. Louis, Canton, Clarksdale, Columbus, Crystal Springs, Chatawa, Durant, Ellisville, Fort Adams, Fernwood, Gallman, Greenwood, Gulfport, Greenville, Hamburg, Hattiesburg, Houston, Norfield, Ocean Springs, Osyka, Oxford, Pascagoula, Pass Christian, Pearlinton, Pelahatchie, Ridgeland, Rodney, Shaw, Starkville, Summit, Terry, Tillatoba, Tylertown, Vicksburg, West, Wesson, West Point, Woodville and Yazoo City.



Known Argentine Ant  
Infestations in Mississippi,  
July 1922.

## A NEW CITRUS CANCKER INFECTION

As a result of the concerted efforts of the State Plant Board and the United States Bureau of Plant Industry in a thorough citrus inspection campaign in south Mississippi, a new infection of citrus canker was discovered by Inspectors R. C. Price and W. L. Blain on June 5, in George county, on the property of J. T. Vise at Agricola, 12 miles south of Lucedale. Seven round-orange trees and three lemon trees were burned and the surrounding soil carefully disinfected.

The source of this canker remains a mystery as all the trees were seedlings and the only other citrus trees on the property were some young Satsumas which were not infected. The property is several miles distant from the nearest place canker had ever been found before. A very thorough inspection of all the properties within a radius of several miles failed to reveal any other infections.

The recent scouting and inspection campaign was the most extensive one conducted in several years. Beginning in May and extending until July 1, almost all the citrus properties in Jackson, Harrison, George, Hancock, Stone, Lamar, Forrest, Perry, Greene and Pearl River counties were inspected, not including those previously inspected by the Plant Board during the few months prior to this campaign. A total of 75,737 grove trees, 32,751 nursery trees, and 172,638 Citrus trifoliata trees were inspected during the period.

The success in eradicating citrus canker in Mississippi has been remarkable. Starting with 108 infected properties in 1916 it required only a short time to wipe out these spots, and until September, 1921, no new infection had been found since 1918. The discovery of this new infection in Jackson county in September, 1921, created sentiment in favor of the general scouting campaign over south Mississippi with the results just described. The finding of only one infection in a campaign so widespread and thorough, while giving ground for the belief that the state is now entirely free from canker, also emphasizes the necessity for continued scouting for this pest; for if this canker had not been found it might have become the source for the infection of a large area. The Plant Board and the Bureau of Plant Industry will continue to maintain inspectors in south Mississippi on the lookout for this dangerous pest.

## NURSERY PROSPECTS IN MISSISSIPPI

By D. W. Grimes

The people of Mississippi are annually buying from other states nearly 2,000,000 nursery plants with a conservative value of almost \$500,000. It is doubtful if Mississippi nurseries are supplying more than one-third of the demand within the state at the present time.

The fact that the number of out-state nurseries shipping into Mississippi has increased more than 50% during the last two years indicates the growing demand for fruit trees on the farms of the state. This immense local demand, now largely supplied by out-state nurseries, is a challenge to the ingenuity and business ability of the Mississippi nurserymen, because Mississippi can produce high-grade nursery stock as easily and as cheaply as any other state.

To compete more successfully for this local trade, Mississippi nurserymen should study every angle of the business. More attention must be given to the demands of the trade in so far as varieties and kinds of fruits are concerned. More extensive and carefully planned advertising will be one of the best paying investments of the nurseryman, because the bulk of the trade now goes to the more extensively advertised firms. Better locations for nurseries and better cultivation to insure strong, thrifty trees must be a part of the nurseryman's program. Greater precautions against insect pests and plant diseases will also be necessary.

There are now about 130 certified nurserymen and florists in Mississippi, and the organization of an association seems very desirable from every viewpoint. With an organization, concerted plans for advertising and publicity could be carried out, a more standardized system of grading and packing would be used, and the exchange of ideas and methods at the meetings would be of great advantage to the members attending.

## **SWEET POTATO WEEVIL INVADES GEORGE COUNTY**

On May 5 and 8, 1922, Inspector R. P. Colmer found sweet potato weevils on two properties in the southern part of George county. These two properties are about  $1\frac{1}{2}$  miles south of Basin and are within 100 yards of each other. Careful scouting on all other properties in that vicinity and especially on all properties within a mile in every direction failed to show any other infestations.

The owner of one of the infested properties thinks that the weevils were brought to his property by exchanging sacks when he took sweet potatoes to market at Moss Point and Pascagoula. This seems a very reasonable explanation and emphasizes the importance of vigilance in preventing the distribution of serious insect pests and plant diseases from one farm or from one county to another.

George county is the fifth county in Mississippi in which the sweet potato weevil has been discovered. In the other four counties, Hancock, Harrison, Jackson and Pearl River, substantial progress has been made in eradicating the weevil by the agents of the Bureau of Entomology of the United States Department of Agriculture and the

State Plant Board of Mississippi. It is of course somewhat discouraging to find that the weevil has spread into a new county. Every effort will be made to completely eradicate the weevils from this county as soon as possible. These new infestations are five miles north of Jackson county which, at the present time probably contains more properties infested by the sweet potato weevil than the other four counties combined.

## ROSE DISEASES

By L. E. Miles

In response to many inquiries from ladies in all parts of the state in regard to rose diseases, the following information about the diseases and their control is given:

"There are two chief diseases attacking roses in this section, the so-called black spot, and powdery mildew. The first of these is widely distributed and is frequently very destructive. It consists of irregular or oval, indefinitely-bordered black spots upon the upper surface of the leaves. It occurs as a rule only upon leaves that are mature or nearly so. The larger spots are almost half an inch in diameter and coalesce so as to nearly cover whole leaflets. With age the centers turn gray and that portion of the leaf dies. At this time also, the spots become more regular in outline than during the earlier stages. Portions of the leaflets outside the diseased areas turn yellow and the affected leaflets fall off prematurely.

"The second disease, the powdery mildew, is the most widespread and destructive of all rose troubles, occurring both in the open and under glass. It is especially destructive to the Rambler varieties. In mild cases it occurs merely as flour-like, dusty, white patches on the leaves. Ordinarily it is more serious, causing the young leaves, shoots and buds to become dwarfed, curled, reddened and variously deformed. At the same time, such deformed parts are covered with a white, flour-like powder, the spores of the causative fungus, through which further dissemination occurs."

**Control.**—For either of these troubles Bordeaux Mixture is quite effective. It is objectionable, however, because of the unsightly residue left on the leaves. Where the mildew alone is present, a spray of potassium sulphide (liver of sulfur), 1 ounce to 2 gallons of water, is very effective. It has the added advantage of being easy to prepare and apply. It must be prepared freshly each time as it deteriorates rapidly.

"Where both diseases are present, or where black-spot alone occurs, Bordeaux Mixture may be used, or to avoid the objectionable residue on the leaves, a spray of ammoniacal copper carbonate may be prefer-

able. Ammoniacal copper carbonate should be applied once each week after the leaves are out. It is made by dissolving copper carbonate in ammonia-water in the following proportions:

Copper carbonate -----	6 ounces.
Ammonia -----	about 3 pints.
Water -----	50 gallons.

"Weigh out the proper amount of copper carbonate. Set a very small portion of this aside and dissolve the remainder in diluted ammonia, using only enough ammonia to dissolve it. Then add the portion of copper carbonate which was reserved. This will prevent an excess of ammonia which might be injurious to the tender foliage. This strong solution may be preserved indefinitely and diluted with the proper amount of water as needed.

"During the winter, the destruction of all diseased refuse beneath the bushes, such as fallen leaflets and twigs, followed by a good dormant spray, covering both the bushes and the ground beneath is of great benefit in keeping down the black-spot. This must be applied, however, while the bushes are dormant, before the new growth puts out in the spring."

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## MEALY BUGS

(*Pseudococcus* sp.)

By J. M. Langston

Mealy-bugs derive their name from the mass of mealy wax with which they cover themselves and their eggs. These are scale insects, but unlike the armoured scales, the females retain their legs and antennæ throughout life and are able to move about during most of their lives.

The most common member of this genus is the citrus mealy bug, *Pseudococcus citri*. While this insect does most of its damage to citrus fruits, it feeds on a number of different plants, including coleus, oleander, royal palm, fig, geranium, and others. The adult is about 3/16 of an inch long and half as wide with a fringe of short spines encircling the body. The brownish colored body of the insect is covered with a white waxy mass. The eggs are deposited beneath the tip of the abdomen and covered with the same waxy substance. In about two weeks the eggs hatch into young that resemble the adults except that they are smaller and at first do not have the waxy covering. Six to ten weeks are required for these to become adults.

These insects are sometimes controlled by their natural enemies, but if they are present in large numbers, spraying is the best method of reducing them. Spraying with water under considerable pressure

so as to wash the insects off the plants will sometimes control them. One pound of good laundry soap dissolved in about five gallons of water makes a good spray. Kerosene emulsion has also been recommended. To make this:

Dissolve  $\frac{1}{2}$  pound of soap to  $1\frac{1}{4}$  gallons of water, add  $\frac{1}{2}$  pint of kerosene, then stir vigorously until the mixture is creamy white, and apply with a spray pump, being careful that all the mealy bugs are touched with the spray. Repeat the spraying in case the insects reappear.

In case the mealy bugs are attended by the Argentine ant, it may be necessary to use measures to control the ants. When the ants are controlled, the mealy bugs will not be so troublesome, as the ants protect these insects from their natural enemies.

## REPORT OF POTATO BEDDING AT FRUITLAND PARK, MISSISSIPPI

By W. L. Blain

The bedding of the sweet potatoes for the State Plant Board at Fruitland Park, for growing plants to supply the sweet potato weevil infested territory of the state, was begun on February 24 under the supervision of the writer. The land upon which the beds were made was new ground, having been cleared during the past year. Some of the lumber for the beds was in use last year, but had been thoroughly disinfected in order to prevent any possibility of disease getting into this year's crop from that source. In all, 51 beds were used to bed out the required number of bushels of potatoes. The field work was entirely in the hands of the Plant Board inspector and the culling of the potatoes in the storage house was under the direction of the grower.

Every possible precaution was taken to keep any infected potatoes from being bedded out and every potato showing signs of any disease whatever was thrown aside and burned. Everyone employed during the bedding process was repeatedly instructed to be on the lookout for any diseased potatoes and not let a single one pass. Every potato put into the beds went through four cullings; once in the house, again as they were emptied from the containers after being dipped, again by the people bedding them, and lastly, after all were placed the entire bed was inspected before being covered up.

The beds were 5x50 feet with a path four feet wide between the sides and three feet between the ends. The beds were in sections of 16, four wide and four long, and between each section was a roadway 8 feet wide to allow the hauling of fertilizer, dirt, and to facilitate removal of the plants later. In the bottom of each bed a layer of manure  $1\frac{1}{2}$  to  $2\frac{1}{2}$  inches thick was placed, and on this a layer of dirt

about 1½ to 2 inches thick was spread and then leveled off. The potatoes were then placed in the bed close together, a thin layer of pine straw was put on top of the potatoes to help hold them down while the slips were being drawn, and on top of this a coating of dirt about 2 inches thick completed the bedding process. The soil, a rather black sandy soil, is admirably suited for growing sweet potato plants. The beds run east and west and on the west end of each one is a sign designating the variety, and where there are two varieties in the same bed they are separated by a board and each section is labeled properly.

As previously mentioned, bedding began on February 24 and lasted five days. During this time the number of bushels of potatoes bedded was as follows: Porto Rico, 718 bushels; Pumpkin Yam, 22 bushels; Red Dooley, 150 bushels; White Dooley, 40 bushels; Nancy Hall, 100 bushels; Triumph, 300 bushels. Plants from these beds will be delivered free of charge to the owners of farms infested with the sweet potato weevil, such farms being found only in Harrison, Hancock, Jackson, and Pearl River counties. With intelligent co-operation this pest should be completely eradicated in a few years.

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## BEAN ANTHRACNOSE

By L. E. Miles

A great many reports have been received this year from various parts of the state regarding the anthracnose disease of beans. This trouble is world-wide in its distribution occurring in nearly every place where beans are grown. While the disease may be found on some plants year after year it is only during certain periods most favorable for its development that it becomes widespread and causes serious loss. Such periods are usually coincident with periods of rather heavy rainfall, associated with not too high a temperature. Just these conditions were experienced in Mississippi this past spring.

The losses from the disease are due to poor germination of affected seed, to destruction of affected seedlings, to low yield of affected plants, and to decreased value of the product. The principal loss in the production of green beans is due to the spotting of the pods, which renders them unsalable as snap beans and unfit for canning. Southern-grown beans, apparently healthy when shipped, frequently reach northern markets in a badly spotted condition, and if the disease is common in the field, pods kept over night after picking are likely to be badly rusted or spotted in the morning. The lesion may extend through the pod to the seed, discoloring it. The value of the dry seed is thereby lessened. A poor stand often results from the use of such seed, due to the failure of many to germinate, while still others succumb in the seedling stage. Plants which have survived an early attack may give a reduced yield, due to interrupted growth, though the pods themselves may not become spotted.



On the seed, the appearance most characteristic of anthracnose is a decided blackening of the affected parts. Usually this black spot is surrounded by a tawny or tan colored border, or the entire area may consist of the latter color. Sometimes such spots have a lighter center which may crack open, disclosing the affected cotyledon. The spots may occur on any part of the seed coat, and may appear as a small brown or black speck or involve more than half of the surface.

Seedlings from badly diseased seed show blackened cankers on the cotyledons or seed-leaves, in which, under moist conditions, small flesh-colored masses appear scattered over the surface of the lesions. The stem may become affected along its entire length, but usually only below the point of attachment of the cotyledons. The first indication of a lesion is the appearance of brown specks in the epidermis. Later there appears a browning of the tissues lengthwise of the stem and below the epidermis. Still later, small pits appear along the affected area.

The leaves not infrequently become badly affected. The lesions appear on the veins, usually on the underside of the leaf. These have practically the same appearance as those on the stems. The tissue on each side of the infected vein may wither and die. A considerable area of the leaf may become affected in this manner, giving it somewhat the appearance of blight. The petiole may become so badly affected that it cannot support the leaf blade.

It is on the pods that the disease assumes its most striking appearance. The first evidence there, is the occurrence of tiny brown specks in the epidermis. These specks enlarge to spots which become black at the center, with a hazel-colored border of varying width. They may become one-half inch in diameter or even larger and may coalesce to cover the pod from end to end. A canker may extend through the pod to the seed, particularly if infection takes place early, in which case development may cease and the pod becomes shriveled and dried. The center of the spot later becomes lighter in color, and flesh-colored spore masses appear, which later dry down to gray, brown or black granulations or small pimples.

The causative fungus is *Colletotrichum lindemuthianum*, and it attacks all varieties of beans, as well as some other closely related plants. It is especially susceptible to hot, dry weather, and is almost if not entirely absent in periods so characterized. Growers in certain parts of the country, for instance Louisiana, have taken advantage of this fact, and by planting a crop about the first or middle of August, are able to obtain a crop of seed free from the trouble which may be used for planting the following spring.

As preventive measures, the best one that can be given is the use of disease-free seed. If possible they should be obtained from fields



**Anthracnose on Pods of Wax and Green-Pod Beans**  
(From Cornell Memoir No. 42)

in the neighborhood which are known to be free of the trouble. If no such fields are available, the precaution of growing a fall crop may be taken, or hand selection may be resorted to. Only pods without spots should be chosen, if possible from disease-free plants, and after shelling, the seed should be gone over again and every one showing a blemish should be discarded. This will insure a practically disease-free stand, though it will not, of course, insure against the entrance of the disease from neighboring fields.

If the trouble is present in the field, care should be taken against spreading it while cultivating or picking. Neither should be done while the dew is on the plants, and when pods are packed for shipping, or for hauling to the canning plant, all spotted pods should be discarded; since, under such conditions, the fungus spreads rapidly.

There are certain varieties of beans which show resistance to this disease, but none of them are of the snap or stringless type. Until resistant strains of this type have been developed, precautions in the use of clean seed will have to be taken by every grower, since spraying measures have given but little satisfaction. Moreover, under our conditions on account of the intense heat and dry weather of summer and fall there is but little chance of the organism living over from one season to another on dead bean rubbish. In ordinary seasons, therefore, if proper precautions are taken to obtain clean seed, but little damage should be anticipated from this disease.

## **PUBLICATIONS ISSUED BY THE STATE PLANT BOARD OF MISSISSIPPI**

### **CIRCULAR No. 1.**

Mississippi Plant Act of 1918.

Approved by the Governor, March 27, 1918.

### **CIRCULAR No. 2.**

Rules and Regulations of the State Plant Board issued April 1, 1919. (Now obsolete. Superseded by Rules and Regulations published in Quarterly Bulletin, No. 2, Vol. 1, July 1921.)

### **CIRCULAR No. 3.**

Rules 43, 44, and 45, issued January 16, 1920.

(Now obsolete. Rules 43 and 45 have been amended.)

### **CIRCULAR No. 4.**

Rule 46. The Pink Bollworm Quarantine, issued March 31, 1920.

(Now obsolete. Rule amended.)

### **CIRCULAR No. 5.**

Mississippi Plant Act of 1918 as amended 1920, approved by the Governor, April 3, 1920.

**CIRCULAR No. 6.**

Rule 46, The Pink Bollworm Quarantine issued September 1, 1920.  
(Now obsolete. See Rule as amended April 18, 1922.)

**RULES AND REGULATIONS OF THE STATE PLANT BOARD**

(Reprint from Quarterly Bulletin, No. 2, Vol. 1, July 1921.)

**BEE DISEASE ACT OF 1920**

Approved by the Governor, April 3, 1920.

**QUARANTINE CIRCULAR No. 1.**

Issued April 1, 1919. Geo. F. Arnold.  
(Now obsolete. Superseded by Quarantine Circular No. 2.)

**QUARANTINE CIRCULAR No. 2.**

Issued January 15, 1921. Geo. F. Arnold.

**SUPPLEMENT A TO QUARANTINE CIRCULAR No. 2.**

Issued August 1, 1921. Geo. F. Arnold.

**NURSERY INSPECTION CIRCULAR No. 1.**

Instructions for Mississippi nurserymen concerning Plant Board  
Regulations.  
Issued September 10, 1918. Geo. F. Arnold.  
Revised August 21, 1921, by D. W. Grimes.

**NURSERY INSPECTION CIRCULAR No. 2.**

Instructions to out-of-state nurserymen concerning Plant Board  
Regulations.  
Issued September 11, 1918. Geo. F. Arnold.  
(Now obsolete. Superseded by Nursery Inspection Circular  
No. 3.)

**NURSERY INSPECTION CIRCULAR No. 3.**

Instructions to out-of-state nurserymen concerning Plant Board  
Regulations.  
Issued August 1919. Geo. F. Arnold.  
Revised August 1920. D. W. Grimes.  
Revised August 21, 1921. D. W. Grimes.

**BIENNIAL REPORT OF THE STATE PLANT BOARD**

For the years 1918-19. By R. W. Harned, Secretary.  
Issued January 5, 1920.

**BIENNIAL REPORT OF THE STATE PLANT BOARD**

For the years 1920-21. By R. W. Harned, Secretary.  
Issued January 5, 1922.

## QUARTERLY BULLETIN

Published at the end of each Quarter since April 1, 1921. R. W.  
Harned, Editor.

Following numbers have been issued to date:

Vol. 1, No. 1, issued April 1, 1921.

Vol. 1, No. 2, issued July 1, 1921.

Vol. 1, No. 3, issued October 1, 1921.

Vol. 1, No. 4, issued January 1, 1922.

# LIST OF CERTIFIED NURSERY DEALERS IN MISSISSIPPI—SEASON 1921-1922

R. L. Brunson	Laurel
B. B. Ferrell	Meridian
Frank H. Harper	Hattiesburg
I. Kling and Son	Hattiesburg
F. T. Mullikin	Kossuth
S. S. Rogers	Meridian
A. P. Stuart	Natchez
Vicksburg Floral Company	Vicksburg
W. G. Warmood	Greenwood

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

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Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

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R. W. HARNED, Entomologist.....	Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

Elsewhere in this bulletin there are short statements in regard to several insects new to Mississippi that are potential pests of great importance. The new weevil discovered in Stone and Harrison counties feeding especially on potatoes may prove to be a serious tomato weevil from Australia or a dangerous potato weevil from South America. No matter what its name may be or where it originated, it is an unwelcome guest. Equally unwelcome is the new sugar-cane borer that has so far been found on only five properties in Harrison county.

The Plant Board in co-operation with the Bureau of Entomology of the United States Department of Agriculture is investigating these new pests as thoroughly as available resources will permit. If eradication seems possible and practical, our efforts will be directed along that line. If eradication seems impractical, we hope that satisfactory control measures may soon be developed.

The early discovery of these new pests before they have had an opportunity to spread over a large area emphasizes once more the importance of having well-trained and efficient entomological inspectors constantly in the field and constantly searching for new pests. The appearance of these insects near to our Gulf ports indicates that probably the pests were brought in on vessels from foreign countries. This also emphasizes the value of our port inspection service that has been started to prevent occurrences of this kind in the future—or at least to make them much less likely to happen

We are fortunate in having in this issue a paper on the pink bollworm situation by Dr. W. D. Hunter, a member of the Federal Horticultural Board, who has been closely connected with all the investigations and efforts to eradicate this pest since its first appearance in the United States. Because of the importance of the pink bollworm to the people of Mississippi, and the fact that Dr. Hunter is doubtless more thoroughly familiar with the situation than any other person in the country, the readers of the Bulletin should not fail to give his article close attention.

A recent compilation of the figures taken from cotton seed permits on file in the Plant Board office indicates that the farmers of Mississippi have perhaps this spring broken all previous records in the purchase of cotton seed for planting purposes from other states. According to the permits filed for the 1922 season, 102,112 bushels of cotton seed were shipped into Mississippi for planting alone. Commenting on this, P. P. Garner, Commissioner of Agriculture and chairman of the State Plant Board, suggests that in view of the high cost of the imported seed and the great danger of bringing in the pink bollworm in seed from an undiscovered infestation in an unquarantined state, that it would be a wise plan for farmers to begin planning now to save their own planting seed for next years crop.

This is a timely suggestion. The Mississippi Experiment Station has already proven that Mississippi-grown cotton seed of any variety produces more than seed of the same variety brought from another state. Then why pay high prices and run the risk of getting the pink bollworm in seed from other states when more cotton can be made from Mississippi-grown seed? Where a farmer is not satisfied with his own seed he should make arrangements with some reliable planter or cotton breeder to supply his needs, for as Prof. Garner well says, "It is a matter of pride that Mississippi has within her borders some of the outstanding leaders in cotton breeding."

Elsewhere in this issue is an article on the spread of the Argentine ant in Mississippi. Towns that have already had a poisoning campaign as well as those with only a small infested area cannot be too strongly urged to put out the poison this fall. Statements from many citizens in towns that poisoned the ants last fall indicate that 90% or more of the ants were killed. A news item from Hazlehurst appearing in the Brookhaven Leader of July 19, 1922, after commenting on the almost complete disappearance of the ants after the campaign, says: "The city council has spent \$1,000 in conjunction with the State

Plant Board, and estimates that it has saved the townspeople at least fifty times that amount this summer." But unless this success is followed up with other campaigns it will be only a short time until the ants will be as bad as ever. Towns with small infestations should start a campaign at once while the expense will be small. Five years from now it may take \$500 to check the ants where \$100 would do the work this fall.

Public-spirited citizens and officials of the infested towns should begin working for poisoning campaigns at once. Mayors should request the Plant Board to survey their towns and submit estimates of the cost of campaigns. There is no charge for this. Then the town can raise the money for buying the poisoning materials and the Plant Board will furnish inspectors without charge to supervise the work as soon as the official request of the mayor is received. There should be no delay in starting as the poisoning season will soon be at hand. Don't put it off!!

### LOOK FOR BEE DISEASES NOW

The progress made last summer in eradicating European and American Foulbrood from the apiaries in ten Delta counties was very gratifying as more than 6,000 colonies were examined and the diseases greatly reduced, European Foulbrood apparently decreasing 62½%, and American Foulbrood 85%. To date, American Foulbrood has been found only in Bolivar, Quitman, Sunflower and Washington counties. European Foulbrood occurs in the counties just named and also in Coahoma, Panola, Sharkey, Tallahatchie, Tunica and Yazoo counties.

However, it is possible that these diseases may occur in other parts of the state and all beekeepers should make a careful search for them at this season and at frequent intervals during the summer. Though sometimes resulting from other causes, the finding of dead larvæ (young bees) in the comb is sufficient evidence to suspect the presence of foulbrood. Samples of the comb containing the dead larvæ should be sent to the Plant Board for determination, as it is important that the Board know it if the diseases occur in other parts of the state.

For mailing, a specimen of comb 4 inches by 5 inches, or about that size, should be selected. It should contain a number of the dead larvæ and be as free from honey as possible. Wrap well in newspapers and mail in a wooden container such as a cigar box. The name and address of the sender should be plainly written on the box and a letter of explanation at the same time is advisable in order to insure a speedy reply.



## ILLUSTRATED LECTURES AT SCHOOLS

To encourage boys and girls all over the state to be constantly on the watch for new pests, and to stimulate interest in the study of insect pests and plant diseases, the Plant Board has given illustrated lectures at a large number of schools over the state, showing the pink bollworm, the sweet potato weevil, the alfalfa weevil, the European corn borer, and many other pests which the Board is trying to keep out of Mississippi.

This work began in 1921 when lectures were given in more than thirty county agricultural high schools. The work has been continued this year and during the past quarter lectures have been given in the agricultural high schools in the counties named below:

Alcorn	Lafayette	Tallahatchie
Amite	Leake	Tate
DeSoto	Marshall	Tunica
Greene	Montgomery	Wayne
Itawamba	Scott	Yalobusha
Jefferson	Sunflower	Yazoo

The same lectures have also been given in the following town schools and consolidated schools:

McLain (Progress Consolidated), Braxton (Piney Woods Country Life School), Clarksburg, Cleveland, McNeil, Lumberton (Hickory Grove), Baxterville, Arkabutla, Horn Lake, Ashland, Water Valley (Jefferson Davis Consolidated), Vicksburg (Culkin Academy), Bovina, Tylertown, Columbia (Mississippi Industrial and Training School), and Derby.

For the same purpose, illustrated lectures have also been shown at more than a dozen boys' club camps over the state and much interest has been manifested in many cases, not only by the boys but by their parents who were present also.

\* \* \* \* \*

## BEE DISEASE ERADICATION REPORT

On account of heavy and frequent rains in the early spring, as well as high water in many sections of the Delta, no apiary inspection was attempted until June 1. As only a few inspectors were available for this work during June, operations were confined chiefly to the four counties named in the report below. Washington county beekeepers especially are to be congratulated on the fact that in 33 apiaries containing 1,239 colonies, the inspectors found only 11 old-fashioned box

hives. This is a record which other counties might well strive to attain.

Apiary Inspections—June 1-June 30, 1922

County—	No. of Apiaries	Box Hives	Frame Hives	Infected European Foulbrood	Infected American Foulbrood
Bolivar -----	11	149	580	117	15
Leflore -----	21	119	136	27	0
Washington --	33	11	1228	111	291
Quitman ----	21	56	129	31	37
Total--	86	335	2073	286	343

\* \* \* \* \*

SUMMARY OF SCOUTING WORK DONE IN COUNTIES IN SOUTH MISSISSIPPI FOR THE SUGAR CANE BORER, *DIA-TRAEA SACCHARALIS CRAMBIDOIDES*, GRT., AND THE NEW UNDETERMINED PINK NOCTUID BORER.

By E. K. Bynum

Total number of properties inspected.....	60
Total number of inspections made.....	67
Total number of acres inspected.....	45
Total number of properties found infested with sugar cane borer	6
Total number of properties found infested with pink borer.....	5
Total number of inspections made in George county.....	2
Total number of inspections made in Jackson county.....	7
Total number of inspections made in Stone county.....	7
Total number of inspections made in Hancock county.....	7
Total number of inspections made in Harrison county.....	44

The pink borer has only been found in Harrison county

The sugar cane borer has been found in Harrison and Hancock counties.

## QUARANTINE INSPECTION REPORT

For Period from January 1 to June 30, 1922

By Geo. F. Arnold, Quarantine Inspector

## Ships and vessels inspected:

From foreign ports .....	40
From U. S. ports .....	1
Total .....	41

## Parcels inspected:

## Arriving by water—

Passed .....	0
Treated and passed .....	0
Returned to shipper .....	3
Destroyed .....	1
Total .....	4

## Arriving by land: express, freight, wagon, etc.—

Passed .....	13586
Treated and passed .....	1
Returned to shipper .....	15
Contraband destroyed .....	57
Total .....	13659

## Arriving by mail—

Passed .....	2980
Treated and passed .....	100
Returned to shipper .....	13
Contraband destroyed .....	63
Total .....	3156

Grand total of parcels inspected..... 16819

## Number of parcels on hand June 30, 1922, pending determination as to final dispositions.....

Total parcels passed .....	16566
Total parcels treated and passed .....	101
Total parcels returned to shipper .....	31
Contraband destroyed .....	121

Grand total..... 16819

**NURSERY INSPECTION REPORT**

For Period Beginning January 1, 1922 and Ending June 30, 1922

By D. W. Grimes, Nursery Inspector

Number of nurseries inspected.....	122
Acreage in nurseries inspected.....	372½
Amount of nursery stock inspected:	
Grafted and budded pecans.....	279,412
Seedling pecans .....	147,575
Total pecans.....	426,987
Citrus trifoliata .....	97,845
Orange .....	28,437
Grapefruit .....	190
Miscellaneous citrus .....	40,664
Total citrus .....	167,136
Apples .....	74,550
Pears .....	54,032
Peach .....	14,325
Japanese persimmon .....	1,900
Grapes .....	13,322
Figs .....	14,354
Strawberry .....	288,989
Miscellaneous fruit .....	39,300
Total fruit stock (citrus excluded).....	500,773
Rose .....	58,170
Other ornamentals .....	692,227
Total ornamental stock.....	750,397
Grand total of plants inspected during period.....	1,845,293

\* \*

**CITRUS CANKER SCOUTING REPORT**

For the Period January 1-June 30, 1922

Number of counties in the state which have at one time or another since 1916 shown canker.....	4
Number of counties showing canker Jan. 1-June 30.....	1
Number of grove trees inspected Jan. 1-June 30, 1922.....	75,737
Number of nursery trees inspected Jan. 1-June 30, 1922.....	32,751
Number of C. trifoliata inspected Jan. 1-June 30, 1922.....	172,638

Total number of grove trees found infected June 1, 1916 to June 30, 1922 -----	3,097
Total number of nursery trees found infected June 1, 1916 to June 30, 1922 -----	51,167
Number of properties infected during 1917-----	47
Number of properties infected during 1918-----	14
Number of properties infected during 1919-----	4
Number of properties infected during 1920-----	0
Number of properties infected during 1921-----	1
Number of prcproperties infected during 1922-----	1
Number of new properties infected during 1917-----	12
Number of new properties infected during 1918-----	1
Number of new properties infected during 1919-----	0
Number of new properties infected during 1920-----	0
Number of new properties infected during 1921-----	1
Number of new properties infected during 1922-----	1
Total number of properties found infected June 1, 1916 to June 30, 1922 -----	123
Total number of properties declared no longer danger centers--	121



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THE QUARTERLY BULLETIN  
— OF THE —  
STATE PLANT BOARD  
OF MISSISSIPPI

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

### MEMBERS OF BOARD

P. P. GARNER, Chairman-----Commissioner of Agriculture  
Jackson, Mississippi

J. R. RICKS-----Director Agricultural Experiment Stations  
A. & M. College, Mississippi

R. W. HARNED, Secretary-----Entomologist  
A. & M. College, Mississippi

# The Status of Sweet Potato Weevil Eradication in Mississippi

K. L. Cockerham

Three years ago the Bureau of Entomology and the Mississippi State Plant Board took up co-operatively the task of sweet potato weevil eradication in Mississippi. The plan of the work was for the Bureau to furnish the men to do the field work and the State Plant Board was to furnish material and equipment such as seed potatoes, planting stock, *et cetera*.

The first thing necessary was a survey of the situation to determine just how extensive the infestation was. This was done by making a house-to-house inspection in South Mississippi by Bureau men while State Plant Board men were watching out for weevil in other parts of the State while engaged in their regular routine inspection and scouting. The result of this survey showed only Jackson, Harrison, Hancock, and the lower portion of Pearl River counties infested. The plan that was then put into effect was to sign contracts with the owners of infested farms, whereby they agreed to dispose of any planting material on hand, hog off fields, clean up the premises and rotate their crops. They were also to give such co-operation as might be deemed advisable. In consideration of these things, and in order not to work a hardship on some of the farmers who could not well afford to purchase weevil-free plants, the Plant Board agreed to furnish free of charge all the draws or plants necessary for an ordinary crop. No seed potatoes were permitted to be bedded on any of the infested farms.

The plan that has just been outlined was put into effect in 1920 and has been followed closely for the past three seasons. Needless to say our work has met with some opposition; but on the whole we have secured very good co-operation.

During the late summer and fall field and vine inspections are made, first to determine the per cent of injury on infested farms, and second, to locate any new infestations which might occur. In the late fall and winter contracts for plants for the following spring are signed. In the early spring old storage banks and houses are cleaned out and the old rotten potatoes and rubbish are burned. During the planting season plants are grown and delivered to these infested farms. Each spring the State Plant Board beds down 1,000 to 1,300 bushels of seed potatoes to insure plenty of weevil-free plants; these are grown in Stone county.



It has not been possible to conduct this work without finding new infestations occasionally. These have been confined however to the same infested localities. The neighborly and hospitable spirit which prevails in the South has caused us quite a bit of worry; it has been impossible to prevent the giving away of eating potatoes, plants, and seed potatoes. While this is going on it is almost certain to facilitate the distribution of weevils from one farm to another. But we have been extremely gratified that the infestation has not spread into new territory. The efficient quarantine of the Plant Board has stopped shipments of seed potatoes and plants. At the present writing the infestation in Pearl River county has been reduced approximately 40%; in Hancock 60%; in Harrison 50%; and in Jackson the number of individual infestations has not been reduced. But an important item not to be overlooked is the fact that on these farms that are still listed as infested the injury is much less than it formerly was. Any figures which might be published would not in reality show just how much the damage by this pest has been abated. An idea of how the work has been accepted may be had from the following testimonials:

From a prominent citizen of Hancock county: "Before this work was started I used to see entire crops that were ruined by the weevils; you don't hear of anything like that now."

From a plant grower of Stone county: "Keep up the work on the coast for we don't want the weevil up here. It will absolutely ruin our business."

From citizens of George county: "Whatever you do, don't let the weevil get up here. Keep up the fight until it is eradicated."

With the harvest of this fall's crop it seems evident that still better results will be seen than at this writing. Every indication points to a very greatly reduced infestation in each of the four infested counties.

## THE SUGAR CANE MOTH BORER IN SOUTH MISSISSIPPI

By T. E. Holloway

Entomologist, Southern Field Crop Insect Investigations, U. S.  
Bureau of Entomology.

Farmers in southern Mississippi have recently begun to notice "worms" in the stalks of sugar cane. These are usually seen when the cane is cut for eating, as on such occasions it is more carefully examined than when it is to be planted or ground. The worms are found to bore holes or tunnels through the stalks, making the cane almost worthless where the infestation is very heavy.

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\*Published by permission of the Chief of the Bureau of Entomology.



Fig. 1 Sugar Cane Moth Borer Tunnel—Larva in Middle Stalk

### A Pest in Many Countries

This worm is the sugar cane moth borer, *Diatraea saccharalis* *cynbidoides*, one of the chief sugar cane pests of the world. In the United States its principal damage is in Louisiana, owing to the large acreage of cane in that state, but it also occurs in Florida, Texas, and to a limited extent in Mississippi. An infestation around Woodville in Wilkinson County, north of Baton Rouge, has been known for some years. More recently, the moth borer has been found along the Mississippi Coast, from the Louisiana border to Biloxi, and extending inland from a few miles at Biloxi to about twelve miles (above Log-town) on the Louisiana line.

### Damage to Sugar Cane and Corn

The first damage in the spring is in killing the young plants of sugar cane. Moths emerge from the planted cane stalks and cane debris left about the fields and fly to the young plants, depositing masses of eggs on their leaves. Small worms or larvæ hatch from these eggs, feed a little on the leaves, and then make their way down to about the surface of the ground or a little below and gnaw into the young stalks. The effect on the cane is that the inner part of the plant is killed, while the outer part retains life for a considerable time. The result is that plants can be found with the central shoot dead and dry and the outer leaves still green. While various causes may account for this condition, it is often due to the sugar cane borer, and when caused by the borer a hole can be found in the plant near the surface of the ground with the worm inside the plant.

The large stalks are not killed by the moth borer. Even when there is considerable damage the general appearance of the cane will be unchanged. Only a close examination will show numerous holes through the rind, sawdust-like excrement between the leaves and the stalks, and crooked tunnels within the stalks.

An ordinary infestation of the moth borer causes a loss of from one-sixth to one-third of the crop.

The borer takes readily to corn, which in fact it prefers to cane, and inflicts similar injury. It is especially injurious to late corn. It can breed in large grasses, such as Johnson grass, but it is not usually numerous in such plants. It does much damage to broom corn and to various forage crops such as sorghum, kaffir corn, etc.

### The Life of the Sugar Cane Moth Borer

The larva or "worm" is about an inch in length when full grown. When at its maximum size the larva sheds its skin and becomes a pupa or "cocoon," a brown, legless object which does not feed and is incapable of motion except that it thrashes about with its "tail" or

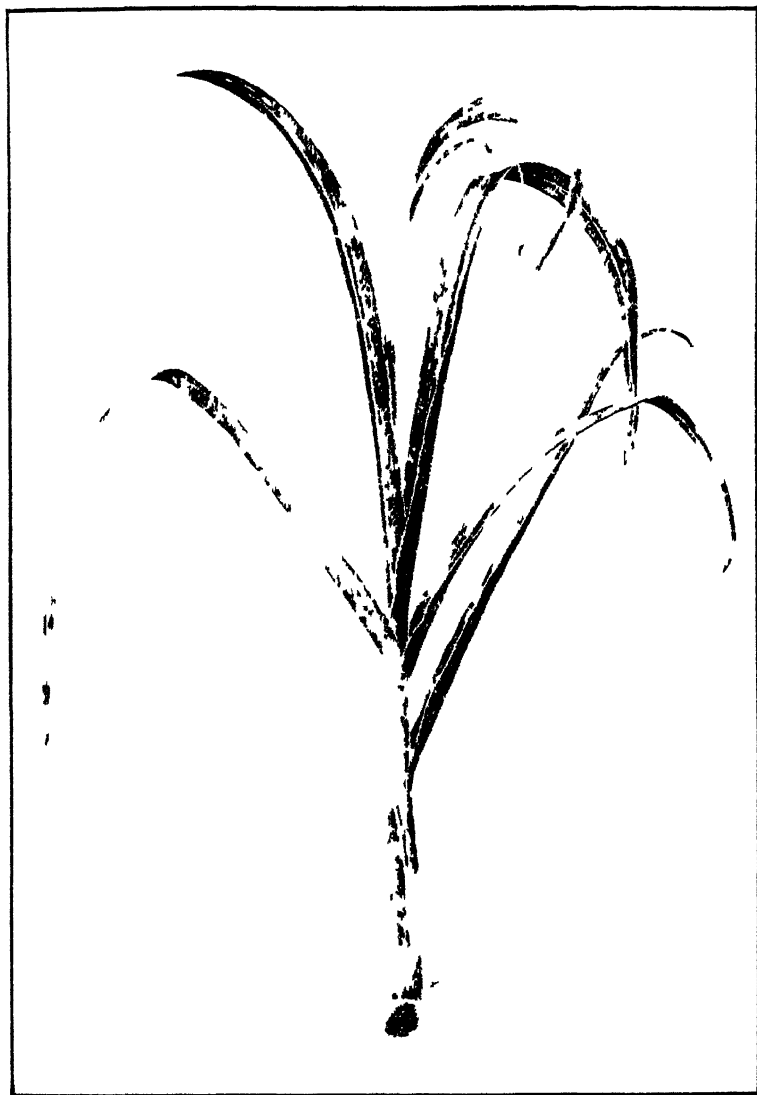


Fig. 2. "Dead Heart" Caused By Sugar Cane Moth Borer.

abdomen when disturbed. In about a week the skin of the pupa bursts open and a straw-colored moth works its way out. Being in a cane or corn stalk, it has to force itself through a hole in the side of the stalk which the larva has previously gnawed for the purpose. After mating, the female moths fly to the leaves of their host plants at night and deposit masses of flat eggs on the leaves. These eggs hatch, small larvæ emerge from them, and after a little preliminary gnawing of the leaves they too make their way into the stalks, spending all the rest of their lives in this protected situation up to the time they become moths.

There are four or five broods or generations of the moth borer during the year. Though there are usually few borers in the spring, the rapid multiplication during the summer brings about a high infestation of the stalks when the cane is ready to grind in the fall. Even long before fall the corn on the sugar plantations is heavily infested, and the stalks becoming dry the moths emerge and fly to the adjoining fields of cane, thus increasing the infestation there.

The pest passes the winter in the worm stage in stalks of planted sugar cane, in scraps of cane left after grinding, in the stems of large grasses, etc. The larvæ become moths in the spring, and can emerge not only from the cane left lying on the ground but also from planted stalks. The moths are able to work their way even through packed soil.

### Control of the Sugar Cane Moth Borer in Mississippi

On the large sugar plantations the moth borer is very difficult to control, but conditions in Mississippi are so different that it is likely that control would be comparatively simple.

There are no large plantings of cane as in Louisiana, where thousands of acres are grown. A field of two acres is regarded in southern Mississippi as rather large, and perhaps the average planting is less rather than more than half an acre. This makes it possible for the owner to give the cane such care and attention as would be out of the question on a typical sugar plantation, especially as the infestation in Mississippi has apparently not reached a high percentage of the stalks.

The writer suggests the following control measures:

- 1.—Plant only cane perfectly free of borers.
- 2.—Destroy all scraps of cane left after the cutting and grinding.
- 3.—In the spring go through the fields and cut out the young plants killed by the borers. Destroy all borers found.
- 4.—Be careful not to ship infested seed cane. To do so may spread the infestation.

## APPLE BLOTCH AND ITS CONTROL

By D. C. Neal, Plant Pathologist

Numerous complaints have been received during the past two seasons from home orchardists, as well as commercial growers, as to the prevalence and destructiveness of apple blotch. This disease of apples has been especially prevalent in many of the northern counties of Mississippi the past year. Blotch constitutes one of the most important diseases of apples in the southern portion of the Mississippi Valley, and many authorities state that it is perhaps more serious and as difficult to control as bitter rot or scab, two other important diseases of this fruit.

### Origin of the Disease

Among pomaceous fruits blotch is known to occur only on the apple. The native species of crab apple are also subject to the disease but it is still an open question as to whether blotch originated on the wild species, and was transferred to the improved species of apple, or whether it came from some other native host. As early as 1895, however, it was found on leaves of wild crab and on apple fruit.

### Economic Importance

Apple blotch is now uniformly present from year to year in the Mississippi Valley states and those of the South and Southwest, and because of its less sporadic nature as compared to other apple diseases, the amount of loss caused by this trouble is sometimes enormous. In such states as Arkansas, Kansas, and the southern portions of Missouri, Illinois, Indiana, Kentucky, and Tennessee, frequently from 25% to 80% of the apple crop is commonly affected. In Benton county, Arkansas, the loss to apple growers from blotch on the fruit in 1907 amounted to \$950,000, while in Clay county, Illinois, the loss annually from blotch is placed at \$50,000. This disease has been reported from some twelve or fifteen counties in Mississippi, and the fact that it appears to be increasing not only in the northern counties of the State, but in other widely scattered sections, it is well that growers and home orchardists should inform themselves as to its presence as soon as possible.

### Symptoms of Blotch

Blotch is found on the fruit (Fig. 3) twigs, and leaves. It is also evident on the older limbs (Fig. 4b) in the form of roughened bands on the bark. It causes the most serious damage on fruit but on varieties especially susceptible to its attack, it may cause the death of fruit spurs or even small branches and thus materially reduce the yield of fruit. Ordinarily the damage to the leaf is not

serious since the spots are always very small and do not cause defoliation. On the fruit the disease appears as blotches or spots from 5-20 mm. in diameter, dark in color, with an advancing margin of peculiar, irregular, jagged, or fringed appearance. The lesions frequently have a stellate (star-like) appearance, which is due to the strands of hyphae radiating from the central area. By coalescence large spots may form, and owing to tension, cracks appear, enlarging to a centimeter in length, or even girdling the fruit and reaching to to the core. In the older portions of the blotched areas, minute

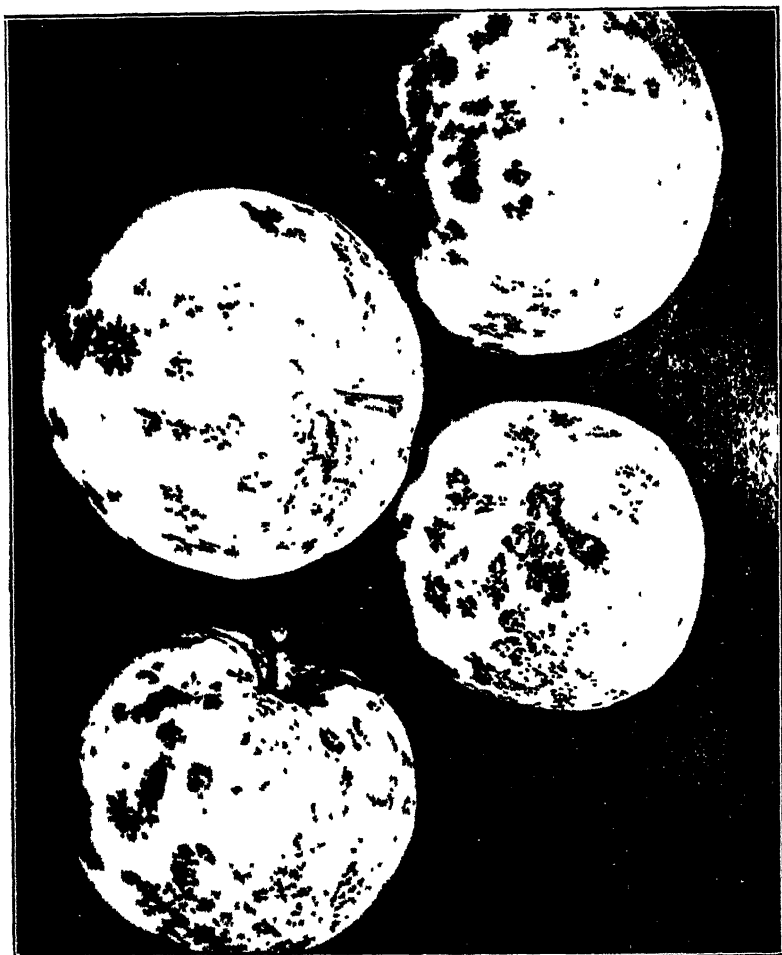


Fig. 3.—Apple Blotch as it occurs on the fruit. (After Duggar)

pycnidia (fruiting bodies) appear. Blotch maims the appearance of the fruit and injures it as a salable product.

On twigs, superficial cankers are produced. These are especially evident on fruit spurs (Fig 4 a, c), and water sprouts (Fig 4 d). If the disease is present in an orchard, it is most surely and quickly found by examining any water sprouts that may be present. The cankers are not evident from infections of the current year, except upon close examination late in the season, when they appear as small, olive-brown spots. The following season, however, the spots on the

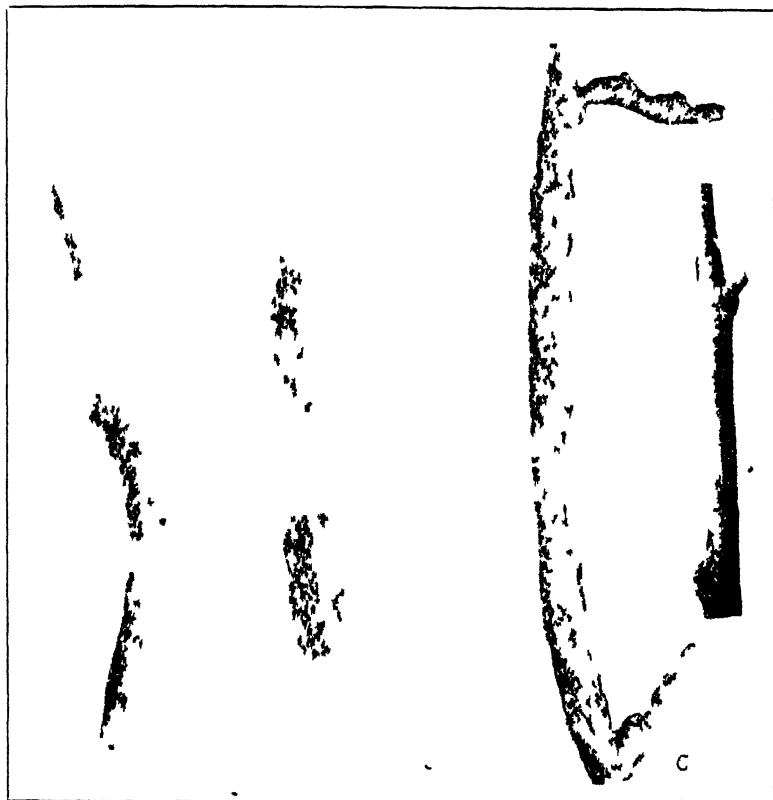


Fig. 4—Blotch: (a) On Fruit Spurs; (b) Old Cankers on Limbs; (c) On Young Branches, Showing Roughened Bark; (d) On Water Sprout, Showing Pycnidia of the Fungus on One- and Two-Year-Old Lesions. (After Anderson, H. W., Ill. Circular No. 241.)



twigs are sharply defined. The central area is slightly raised, light tan in color, with pimples (pycnidia) scattered over the surface. Surrounding this is the reddish-brown area of the current season's development. Upon older limbs and twigs the cankered bark becomes roughened, with cracked-like bands or furrowed areas which are quite characteristic.

### Cause of Blotch

Blotch is caused by a fungus, known as *Phyllosticta solitaria*. This fungus winters in the mycelial state in cankers on twigs and on fruit spurs. In the spring, pycnidia or fruiting bodies are matured beneath the surface of the bark, and these produce spores in great numbers, which are discharged during damp weather, and are carried by water, wind, and insects to the fruit, leaves and twigs where infection takes place.

### Susceptible and Immune Varieties of Apples to Blotch

The Ben Davis, Missouri Pippin, Mammoth Black Twig, Limber Twig, and Maiden Blush are highly susceptible to blotch, while Jonathan, Winesap and York Imperial are almost immune.

### Control of Blotch

For control of blotch, consistent and judicious spraying is necessary. Usually three applications of 3-4-50 Bordeaux mixture or applications of lime sulfur (summer strength) are necessary to control the disease. The first spraying should be made about three weeks after the petals fall. This is the most effective blotch spray as it is applied just before the majority of spores are expected to be discharged. The second application should be given about two weeks after the first and the third about two weeks thereafter. During seasons of wet weather, lime sulfur may be substituted for Bordeaux in order to avoid foliage burning. Continuous care of the orchard from year to year as to matters of pruning and the removal of water sprouts and surplus branches will also aid the necessary spraying program by reducing the number of hibernating places of the fungus. Trees sprayed carefully from year to year are usually free of cankered limbs.

## SOOTY BLOTCH AND FLYSPECK OF THE APPLE

By D. C. Neal, Plant Pathologist

In poorly pruned orchards located on low ground, a cloudy or smoky appearance is produced on the fruit during damp seasons which may result in materially reducing its market value. This disease, also sometimes called "sooty smudge" or cloud, but perhaps

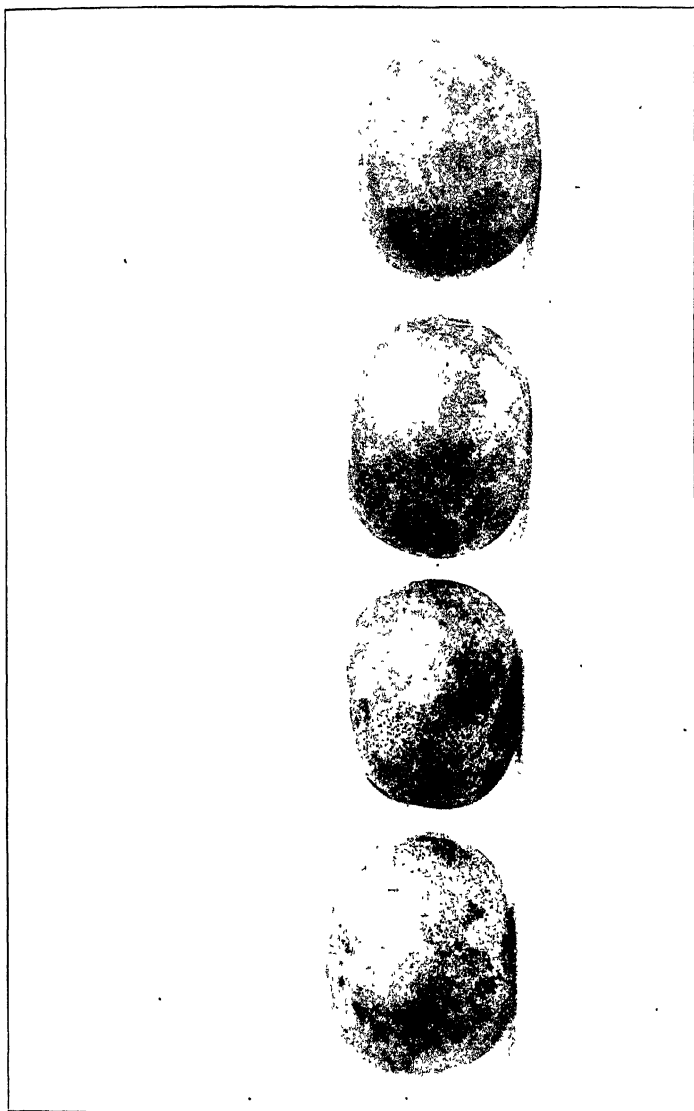


Fig. 5.—Sooty Blotch and Flyspeck on Apples from North Mississippi.  
Flyspeck at Left, Sooty Blotch at Right.

more commonly known as "sooty blotch," is present on both apples and pears in many orchards in Mississippi late in the season. (Fig. 5, right.)

Accompanying sooty blotch there is also usually a disease evidenced by minute black dots covering the surface of the fruit. These black dots form in clusters and resemble to a remarkable extent ordinary flyspeck. (Fig. 5, left.) This fungus does not cause extensive damage, as the growth is entirely superficial, but the market value of the fruit is lowered, particularly in the case of the green or yellow varieties. Flyspeck, like sooty blotch, appears late in the season during wet, cloudy weather, and especially where the orchard is located on low poorly drained soil.

### Cause of Sooty Blotch and Flyspeck

Sooty blotch and flyspeck were for a long time thought to be caused by the same fungus but more recent investigations indicate that they are caused by separate and distinct organisms. Sooty blotch is caused by a fungus known as *Gloeodes pomigena*, whereas flyspeck is attributed to the fungus, *Leptothyrium pomi*.

Little is known concerning the time and manner of infection of both of these diseases, but the relatively late appearance of the diseases on the fruit would indicate a late-spring or summer infection.

### Control

In orchards where these diseases are causing serious injury to the fruit it is advisable, in addition to the regular spray schedule, to apply one or two sprays during July and August. Either the 3-4-50 Bordeaux mixture, or Atomic Sulphur, 1 pound to 8 gallons of water, may be used. Careful and consistent pruning to open up the trees is also effective in controlling sooty blotch and flyspeck. Poorly drained soils and humid localities should also be avoided when selecting the orchard site.

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### MEXICAN BEAN BEETLE EXTENDS TERRITORY

Scouting reports from the Federal Bureau of Entomology show that the Mexican Bean Beetle has continued its general spread this summer in a northeasterly direction, which was the prevailing trend of the pest last year. Due to lack of funds, a comparatively small amount of scouting has been done by the Bureau and it is impossible to accurately estimate the new territory infested this season. Substantial gains to the north and east have been recorded, however, in all the infested states. No new state has reported an infestation, so it is possible that the pest has not yet crossed the borders of any

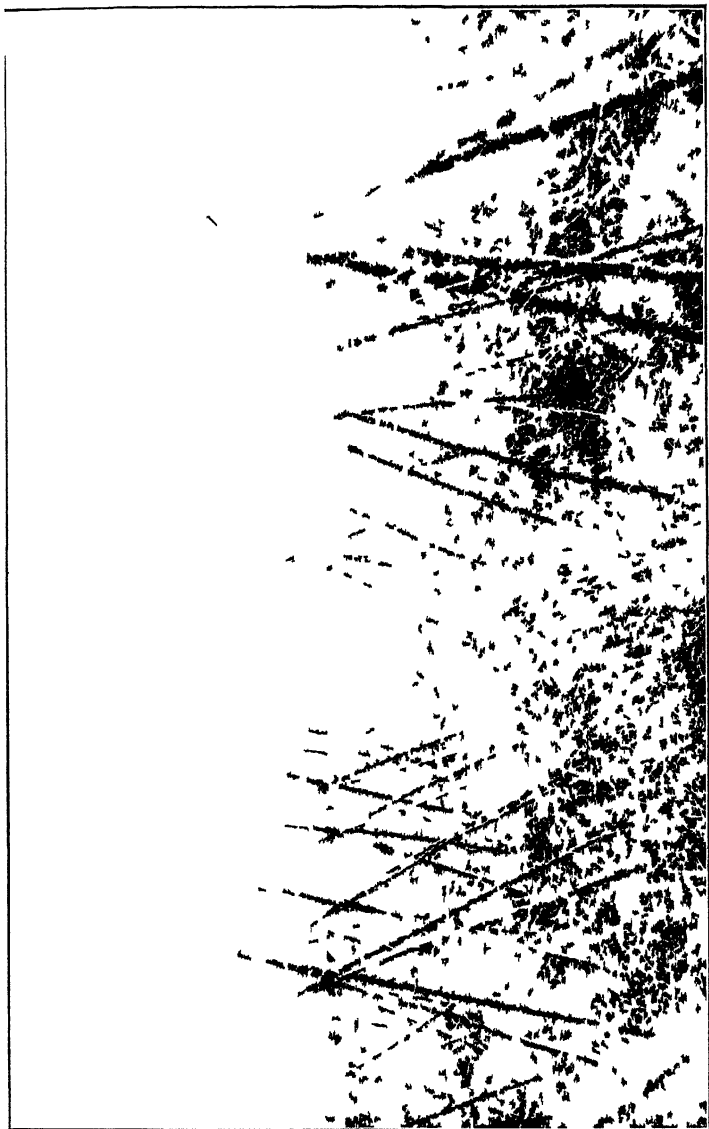


Fig 6—Pole Lima Beans totally destroyed by Mexican Bean Beetle,  
Chattanooga, Tenn (Bureau of Entomology )



Fig 7 —Bean Plant destroyed by Mexican Bean Beetle  
(Bureau of Entomology.)



Fig. 8.—Knapsack type of bellows duster in use against Mexican Bean Beetle. (Bureau of Entomology.)

states except Alabama, Tennessee, Georgia, Kentucky, North Carolina and South Carolina.

It is fortunate indeed for the people of Mississippi that the beetle has no particular inclination to wander westward, for since last summer it has been within a few miles of the line, and reports of its appearance in Mississippi have been expected all this year. People living in the eastern parts of Tishomingo, Itawamba, Monroe, and Lowndes Counties should watch their gardens for the first appearance of the beetles and be ready to use control measures against them. With its decided preference for moving north and east, and barring the chance of accidental importation in hay, beans, or other farm products, it may be several years before serious injury from the pest will become state-wide.

However, this tarrying along the eastern border may be considered only as a reprieve from the serious blow to the bean crop which is sure to come, as shown in the accompanying photographs furnished by Neale F. Howard, of the Bureau of Entomology. Already the Bureau is advising growers to discontinue planting pole beans in sections where the beetles are very abundant, and the control measures necessary to protect bush beans have materially reduced the profits of commercial growers. The U. S. Department of Agriculture has estimated that the annual loss will reach \$100,000,000.

The Bureau has been doing a great deal of experimental control work and one of the most effective measures developed is a dusting mixture of 1 part high grade tri-calcium arsenate and 9 parts hydrated lime, applied to the under surfaces of the leaves, from one to four applications being necessary. Magnesium arsenate, used as a spray at the rate of 1 pound to 50 gallons of water, has also been effective without injuring bean foliage. Most other arsenicals, including Paris green, lead arsenate, and zinc arsenite, are not advised for beans in the Southeastern States.

### THE ARGENTINE ANT SITUATION

Two or three years ago when efforts were made to get certain towns interested in putting on Argentine ant control campaigns, a great many people—perhaps most of the people—in the infested towns doubted if the ants really could be controlled. Practically all of these people are now thoroughly convinced that an Argentine ant control campaign is worth many times what it costs any community. In 1920, the Plant Board assisted four towns in putting on ant control campaigns. In 1921, seven towns were given this assistance. Already this fall, fifteen or twenty towns and cities have begun preparations to put on campaigns to control the ants.

The towns and cities that have so far this fall either put on Ar-

gentine ant control campaigns or have made definite arrangements to do so, are as follows: Aberdeen, Meridian, Laurel, Hattiesburg, Ellisville, Gulfport, Summit, Woodville, Hazlehurst, Greenwood, Durant, Columbus, Starkville, Greenville, Biloxi, Jackson, and Fayette.

The total number of infested places in the state is steadily increasing in number. At present there are about sixty-five towns and cities that are known to be infested. The infestations that have recently been discovered are as follows: Morton, Fayette, Sturgis, Goodman, McAdams, Prentiss and Centerville.

M. R. Smith, Ant Specialist for the Plant Board, has been making surveys of infested towns as rapidly as possible. A few surveys have been made by other Plant Board workers. By the end of the year, the Argentine ant infestation in almost every infested town will be mapped, so that by referring to our maps we can tell almost exactly what the situation is in any infested town. These maps will be revised each year.

#### LIST OF MISSISSIPPI NURSERIES—SEASON 1922-1923

Name of Nursery—	Address—	Kind of Stock—
Aberdeen Floral Company, Mrs. J. R. Young, Proprietor	Aberdeen	Ornamental
J. B. Adams and Son	Pass Christian	General
J. B. Allen	Biloxi	Strawberry
R. L. Atkinson	Madison Station	Strawberry
A. C. Ball	Mantee	General
Eugene Barrett	Lauderdale	Strawberry
Bass Pecan Company, I. E. Bass and Sons, Proprietors	Lumberton and Ocean Springs	General
Bay View Nursery, C. Forkert, Proprietor	Ocean Springs	General
J. W. Beacham	McComb	Peach
A. M. Beall	Gum Pond	Pear
Bechtel Pecan Nurseries, Theo. Bechtel, Proprietor	Ocean Springs	General
V. J. Bell	Eupora, R. No. 3	General
Mrs. Edith Biddle, Florist	Greenwood	Ornamental
D. C. M. Bigham	Pontotoc	General
Biloxi Nursery, James Brodie, Proprietor	Biloxi	General
W. L. Blackledge	Saucier	Citrus and Pecan
Bolen Nursery and Orchard Com- pany, E. E. Bolen, Proprietor	Lucedale	General
W. H. Bouslog	Gulfport and Kreole	General
C. E. Brown	Hattiesburg	Pear
Brown's Vineyard, A. C. Brown, Proprietor	Waveland	Grape



Name of Nursery—	Address—	Kind of Stock—
Bruce Nursery Company, R. W. Bruce, Proprietor	Hermanville	General
Burkett Nursery Company, W. L. Burkett, Proprietor	Columbia	Pecan
California Orange and Pecan Com- pany, A. B. Cox, Proprietor	Helena	Citrus and Pecan
V. Campbell	Wiggins	General
Rosa Carley, Florist	Columbia	Ornamental
Carter Nursery Company, S. P. Carter, Proprietor	Hattiesburg	General
I. P. Carver	Ocean Springs	Pecan
J. H. Chapman and Sons	Batesville	Strawberry
George Chevalier	Gulfport	Ornamental
W. R. Clark	Pecan	Pecan
Cleveland Nurseries	Cleveland	Ornamental
Corinth Floral Company	Corinth	Ornamental
Mrs. Lelia Cordts	Canton	Ornamental
Corinth Nurseries, G. W. Strickland, Proprietor	Corinth	Peach
B. E. Cox	Perkinston	Pecan
J. L. Cox	Batesville	Strawberry
W. A. Cox Nursery Company, W. A. Cox, Proprietor	Gulfport	General
D. L. Crowell	Wiggins	Citrus
R. R. Cruthirds	Ocean Springs	Citrus and Pecan
Dan Cunningham	Big Point	General
Dantzler Farm Nursery, J. L. Scarborough, Manager	Biloxi, R. No. 2	Pecan
L. E. Davis	Gulfport	Ornamental
Murphey Deloney	Ocean Springs	Citrus
Delta Nursery, J. E. Lewis, Proprietor	Greenwood	General
O. W. Dennison	Ocean Springs	General
Driftwood Nursery, Archibald Boggs, Proprietor	Gulfport	General
Eastman Gardiner Company, Fred Weiss, Manager	Laurel	Ornamental
Eastview Nurseries, D. Cunningham, Proprietor	Big Point	Citrus
Carl Eckert	Ocean Springs	General
Edwards Nursery and Orchard Company, J. P. Edwards, Prop.	Ocean Springs	Pecan
Evergreen Nursery, Ferris & Aldridge, Proprietors	Poplarville	Ornamental
Fach Floral Nursery, Carl Fach, Jr., Proprietor	Summit	Ornamental
Mrs. S. C. Fields	Centreville	Ornamental
Ford's Pecan Nursery, Hollis & Ford, Proprietors	Magnolia	Pecan
Fountainbleau Farms, R. W. Hamil, Proprietor	Ocean Springs	Citrus
D. F. Gainey	Gulfport	Strawberry
Mrs. R. L. Glass	Long Beach	Ornamental
W. A. Glasson	Mantee	General
Mrs. E. A. Grantham	Vaiden	Ornamental
W. A. Gray	Brooksville	Strawberry

Name of Nursery—	Address—	Kind of Stock—
Greenwood Floral Company, J. W. Bealle, Proprietor	Greenwood	Ornamental
Greenview Nursery, Mrs. J. W. Summers, Proprietor	Pelahatchie	Ornamental
Gulf Coast Pecan Grove and Nursery, L. B. Moody, Prop.	Long Beach	General
W. J. Guy	McComb	Ornamental
Mrs. Will Halsell	Itta Bena	Ornamental
Miss Inez Hanna	Hattiesburg	Ornamental
Rudolph Hans	Helena	Citrus and Pecan
G. W. Harrison	Corinth	General
B. L. Hart	Fruitland Park	Citrus
Heights Floral Company, Mrs. Mildred Whitfield, Proprietor	Clinton	Ornamental
Highland Farm Nursery, F. G. Snell, Proprietor	Big Point	General
T. A. Hightower Seed Company	Hattiesburg	Ornamental
Hill Crest Farm, Port Gifford, Proprietor	Biloxi	Citrus and Pecan
Mrs. O. B. Hilzlm, Florist	Yazoo City	Ornamental
T. H. Hobgood	Meridian, R. No. 4	Strawberry
W. Paul Hosier Paper Shell Pecan Co.	Pascagoula	General
Horticultural Department, P. B. Monosmith, Manager	A. & M. College	General
W. M. Huntington	Pontotoc	Strawberry
Idlehour Floral Company, L. A. Waas, Proprietor	Greenville	Ornamental
Interior Nursery Company, S. S. Smith, Proprietor	Perkinston	Pear
Jackson Grape Gardens, J. J. Clark, Proprietor	Jackson	General
Mrs. J. T. Jenkins	Dossville	Ornamental
August Jurgens	Ridgeland	Ornamental
Miss Bannie Keenum	Amory	Ornamental
Kenwood Gardens, R. E. Kennington, Proprietor	Jackson	Ornamental
L. F. Kramer	Pascagoula	Pecan
Louis Ladwig	Biloxi	Ornamental
R. E. Langley	Jackson	Ornamental
Laurel Nursery Company, Fred Weiss, Proprietor	Laurel	General
Mrs. W. J. Layton	Brookhaven	Ornamental
Mrs. Sallie A. Lewis	Starkville	Ornamental
Lilydale Nursery, Mrs. J. W. Allen, Proprietor	Long Beach	Ornamental
Lilyland Farms, W. W. Buntin, Proprietor	Starkville	General
M. A. Linch	Louisville	General
D. R. Lindsay	Ocean Springs	General
J. B. Livingston	Pontotoc	Peach Seedlings
Magnolia Floral Company, Ed Heckt, Manager	Gulfport	Ornamental
Mrs. W. E. Mauldin	Macon	Ornamental
H. C. Mayerhoff	Basic	Grape
Miss M. E. McCarter	Moss Point	Ornamental
E. V. McKay	Lucedale	General

A. McKenzie	Laurel	Pecan
W. W. McMurtray	Bentonla	Pecan
Chas. H. Morehead	Gulfport	Grape
F. T. Mullikin	Kossuth	Ornamental
J. D. Nettles	Long Beach	Ornamental
E. T. Newell and Son	Meridian, R. No. 4	Strawberry
Mrs. E. C. Newbern	Cedar Bluff	Ornamental
Newton Nurseries,		
J. R. Woodham, Proprietor	Newton	General
Mrs. R. P. Nickles	Steens	Ornamental
North Carolina Pecan Ranch,		
P. F. Barber, Proprietor	Helena	Citrus and Pecan
Oakridge Cemetery Nursery,		
J. H. Adams, Manager	Clarksdale	Ornamental
Ocean Springs Pecan Nursery,		
G. C. Pabst, Manager	Ocean Springs	Pecan
T. G. Owen and Son, Florists,		
T. G. Owen, Proprietor	Columbus	Ornamental
W. L. Pack	Hattiesburg	Pecan
Carrie Jones Parker	Como	Ornamental
J. Ranse Parker	Lucedale	General
W. P. Payne	Lauderdale	Strawberry
A. A. Pigford	Lumberton	General
W. E. Pigford	Russell	Strawberry
M. D. Price	Biloxi, R. No. 1	Citrus and Pecan
Poplarville Nursery,		
J. J. Scarborough, Proprietor	Poplarville	General
R. T. Ramsay	Ocean Springs	Pecan
W. P. Ramsay	Ocean Springs	Pecan
Ratcliff and Savage	Lauderdale	Strawberry
S. R. Ratliff	Vancleave	Pecan
Miss Anna Reed	Gulfport	Ornamental
B. Reinike	Long Beach	Pear
Mrs. M. W. Richardson	Ocean Springs	Pecan
Riviera Gardens,		
W. S. Marshall, Manager	Ocean Springs	General
Rudolph Floral and Nursery Com-		
pany, Fred Rudolph, Proprietor	Laurel	General
The Misses Rogers	Centreville	Ornamental
Delmas Ryan Nurseries	Ocean Springs	General
S. P. Ryan	Ocean Springs	General
T. J. Ryan	Hattiesburg	General
T. M. Scanlan	Newton	Strawberry
Scott Nursery,		
A. C. Scott, Proprietor	Hazlehurst	General
C. O. Shackelford	Columbus	General
Rosedale Gardens,		
G. D. Smalley, Proprietor	Biloxi, R. No. 2	Ornamental
Francis A. Saucier	Pascagoula	Ornamental
Shannon Brothers Nursery,		
S. H. Shannon, Proprietor	Meridian	Pecan
Mrs. J. S. Sinclair	Meridian	Ornamental
W. M. Smith, Strawberry Grower	Landon	Strawberry
Stemme and Son	Hattiesburg	Ornamental
Mrs. J. H. Stockett	Centreville	Ornamental

Stuart Pecan Ranch,		
J. C. Wright, Proprietor	Ocean Springs	Pecan
Mrs. W. R. Stuart	Ocean Springs	Pecan
Mrs. O. C. Suggs	Hattiesburg	Strawberry
M. Sumedinger	Pascagoula	Citrus
Mrs. H. D. Taylor	Como	Ornamental
R. B. Thompson	Pascagoula	Pecan
Toomsaba Nurseries, W. C.		
Rogers and Son, Proprietors	Toomsaba	General
J. L. Travis	Batesville	Strawberry
Tupelo Floral Company,		
Mabry and Ballard, Proprietors	Tupelo	Ornamental
United States Nursery Company,		
L. M. Jenney, Manager	Roseacres	Ornamental
Van Cleave Nurseries,		
W. R. Vancleave, Proprietor	Pascagoula	General
F. M. Vandergrift	Ocean Springs	Pecan
J. M. Vinson	Canton	General
H. M. Ward	Canton	Kudzu
Wilson Farm Nursery,		
Joe P. Wilson, Proprietor	Landon	General
Mrs. Viney Woodson	Sturgis	Ornamental
Mrs. Annie Wolfe	Amory	Ornamental
Watson Nurseries,		
John F. Watson, Proprietor	Embry	General

### THE BUFF-COLORED TOMATO WEEVIL OF AUSTRALIA IN SOUTH MISSISSIPPI

In the last number of the Quarterly Bulletin there appeared a brief discussion entitled, "A New Potato Weevil in Mississippi," that told of the discovery in South Mississippi of an interesting and possibly important pest of potatoes and tomatoes. There have been no new developments to indicate that this insect will become of any special economic importance. Mr. E. K. Bynum has, however, continued his observations and studies of this weevil.

Growers of potatoes and tomatoes in all parts of Mississippi should search frequently and thoroughly for this weevil. It is possible that its distribution may be much more extensive than we now suppose.

For the benefit of our Plant Board workers and for all others interested in potatoes and tomatoes and the discovery of this Australian pest in our country, we are publishing in full a recent letter received by Mr. J. E. Graf of the United States Bureau of Entomology, from Mr. Walter W. Froggatt, Government Entomologist of

New South Wales, and an article published by him in the *Agricultural Gazette* of New South Wales on December 2nd, 1915.

“Entomological Branch, Agricultural Museum,  
George Street North, Dawes Point,  
“J. E. Graf, Esq., Sydney, N. S. W., Aug. 9, 1922.  
Entomologist in Charge, Field Control,  
Bureau of Entomology,  
Department of Agriculture,  
Washington, D. C.

“Dear Mr. Graf:—Your letter of the 16th of June, enclosing a memo. from Mr. Chittenden, to hand.

“It is a very remarkable thing to find our tomato weevil, ‘*Desiantha nociva*’ turning up in the Southern States of America.

“I am sending you my leaflet giving an account of it as a pest on tomatoes, but I might say that it is now largely cosmopolitan in its taste, and in our vegetable gardens there is so much damage to our root crops that it is particularly known in some places as the ‘Carrot weevil.’ The curious larva and curious habit of coming out of the soil at night to feed on plants is quite unique in the life history of weevils. It is possible that this weevil is not a native of Australia, but is an importation from some other country, and it is certainly much more common in the coastal districts than anywhere else, which would lead to the idea that it is an introduced and not an indigenous species. It is however widespread, very common and certainly increasing.

“Thanking you for the information which I have carefully noted,

Yours faithfully,  
(Signed) “Walter W. Froggatt,  
“Entomologist.”

“Dec. 2, 1915      Agricultural Gazette of N. S. W.      1065  
Miscellaneous Publication No. 1856

**The Buff-Colored Tomato Weevil**  
(*Desiantha nociva*)

Walter W. Froggatt, F. L. S., Gov. Ent.

“This destructive beetle belongs to a small group of weevils which damage plants in both the larval and adult stages of their existence. The grubs are slender, active, pale green larvæ, quite unlike the typical form of the family *Curculionidae*, and not unlike, in some cases, the caterpillars of sawflies.

“These grubs hatch out in the soil, and sheltering underground come out at night and feed upon the bark and foliage of plants, they

pupate in the earth, from whence, later on, the perfect beetles emerge, and do even more damage than the larvæ, also feeding at night and seeking shelter during the day time.

"This species was recorded from Victoria in 1908-1909, by Mr. Chas. French, junior, in the *Victorian Journal of Agriculture*, from the vicinity of Melbourne, where it did a great deal of damage to tomato plants, cabbages, and other field crops. It is figured and briefly described in Part V of French's Handbook of the Destructive Insects of Victoria, 1911. It was scientifically described and named by Mr. A. M. Lea, in the Transactions of the Royal Society of South Australia, in May, 1909.

"The buff-colored tomato weevil is under half an inch in length, thick set in proportion to its length, with the short broadly rounded thorax, and back flattened. The snout is slender, with the usual elbowed antennæ, clubbed at the tips, standing out in front of the snout; at the extremity of the snout are situated the sharp jaws, with which it does all the damage. The ground color, as is the case in many weevils, is dark blackish-brown, but so thickly clothed with fine buff and grey scales, and fine scattered hairs of the same tint, that it has a uniform earth-colored tint that enables it to elude detection when resting motionless upon the dry soil with its legs tucked under its body, a fine example of protective mimicry. When disturbed, however, it is a very active little creature, and runs off to cover at once.

"Feeding at night, and hidden away in the cracks of the ground, or just under the surface soil, these beetles may be quite numerous, and yet escape detection, unless looked for at night time when they are feeding.

"This weevil has a wide range over the eastern and southern coasts of Australia, and in this state we have several records of it damaging the young buds and shoots of fruit trees and vines in the early summer, but it was not known as a serious field crop pest until this season.

"Early in October of this year several specimens were received at the office, chiefly from the Gosford District, with the information that it was doing a great deal of damage to the tomatoes. Last month, accompanied by the district fruit inspector (Mr. Oscar Brooks), I visited the tomato plots of Mr. Young at Ourimbah, and saw the work it was doing.

"A great number of the plants had been eaten out and replaced for the second and third time by fresh seedlings; some of the older ones remaining were represented by a few inches of the main stem of what had once been a tomato plant, from which half the surface had been gnawed off in patches. Mr. Young had previously collected some hundreds of beetles, and we were able to discover about half a

dozen, generally in pairs, hiding under the plants. When the owner had written asking for assistance, previous to my visit, knowing the habits of the beetles, I suggested scooping out little depressions in the soil beside the plants, and filling it up with a handful or two of weeds, grass, or loose rubbish. This experiment he had carried out, and had found it an excellent method of trapping the beetles that sought shelter under the rubbish, instead of burying themselves under the soil. Collected together in this way, it was a very easy matter to go round every morning, examine these simple traps, and destroy the beetles. He had previously been going around the tomato plots in the night time with a lantern, and hand-picking the beetles, but as they dropped off at the least alarm it was very unsatisfactory work. Where the seedlings are well grown, after being planted out, it might be possible to place a ring of stiff oiled paper around each stem, and keep the beetles from getting on to the plants. Though provided with a pair of well-developed flying wings, hidden under the elytra or wing covers, I have never seen them attempt to fly.

"About ten species of the genus *Desiantha* have been described from Australia, most of which have been recorded from this state. Probably most of them are very similar in their habits, while several are well-known orchard pests.

"One species, *Desiantha maculata*, has a very wide range over Australia, from New South Wales to the islands on the coast of Western Australia. Lea states that in Western Australia it is at times very abundant, and very destructive to the buds on fruit trees, and especially bad upon the young shoots of the grape vines.

"Another species, *D. malevolens*, is also a serious pest in the Swan River district of Western Australia, and does very similar damage in the orchards.

"All these foliage-eating beetles are difficult pests to cope with, both on field crops and orchard trees, as they are much more difficult to kill with arsenical sprays than caterpillars, and would, even if the poison acted in a reasonable time, do most of the damage before they died. A contact poison has no effect upon them, as they are well protected with their hard chitinous covering. Therefore, trapping them seems to be the only practical way of destroying them."



# THE QUARTERLY BULLETIN

## STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....	Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

### KEEP LOOKING FOR THE PINK BOLLWORM

Each fall and winter for the past five years the pink bollworm has been discovered at some new point in the United States. This most dreaded of the cotton pests has been found in three states—Texas, New Mexico and Louisiana. No one can predict with any degree of certainty where it will next be discovered. We all hope that the pink bollworm has not yet reached Mississippi and that it may never reach this state. To be on the safe side, however, every person in Mississippi who handles cotton or cotton seed should be constantly looking for this pest. If it is in the state or should be brought into the state, its prompt discovery might mean the saving of the cotton industry of the state and nation. All worms found in cotton bolls or cotton seed should be mailed promptly to the Plant Board office for determination.

### GET READY FOR CORN WEEVILS

Now is the time for farmers to make preparations to prevent weevil damage to their corn this winter. All old corn should be removed from cribs, which should be swept out clean and the floors and walls made as tight as possible.

From many observations made, it is evident that weevil damage is usually greatest in corn fields near barns, consequently such corn should be stored separately and fed as soon as possible. Another important measure mentioned is sorting the weevil-infested ears from



the other corn when it is gathered. This may be done by having a barrel in the wagon to hold the infested ears, which are emptied in a separate place at the barn for immediate feeding.

Weevil damage can also be greatly reduced by selecting seed corn with long shucks extending well out beyond the tip of the ear and covering it completely. Experiments have shown that such ears will be undamaged even when exposed to the weevils for months. Fumigation with carbon bisulphide or "High Life" is very effective against weevils in tight cribs and should be used before the weevils are numerous enough to damage the corn seriously. A circular on fumigation with carbon bisulphide may be obtained by writing the State Plant Board, A. & M. College, Miss.

### HAY SHIPMENTS ARE BEING WATCHED

Reports have been received that certain hay dealers are reconsigning to Mississippi shipments of hay that may have originated in states that are infested with the Alfalfa Weevil. George F. Arnold, Quarantine Inspector, therefore, recently sent the following letter to each hay dealer who has received Plant Board permits to ship hay into Mississippi:

"Dear Sir:—We have recently received information that causes us to suspect that some of the firms who hold hay permits have been making reconsignments of hay into Mississippi from the states infested with the *alfalfa weevil*. You will recall signing an affidavit that you would not ship any hay into this state that was grown in the states of Colorado, Idaho, Nevada, Oregon, Utah and Wyoming. This affidavit states that you will be positive of the exact locality in which all hay shipped into Mississippi is grown, thereby eliminating the possibility of an error which might allow the shipment of hay from one of the above mentioned states.

"We wish to warn you that a thorough investigation will be made to determine if any firms have actually been making shipments from the prohibited areas. We will immediately cancel the permits of all firms found guilty of making such shipments and start legal proceedings under authority of the state law.

"In the enforcement of these regulations we are endeavoring to protect the alfalfa growing interests of our state against the *alfalfa weevil*. This pest has never been found in Mississippi and would cause a tremendous loss to the alfalfa growers should it ever become established here. It has been estimated that the loss from the weevil in some of the states in the Northwest totals about 50% of the alfalfa crop each year. We feel that we are justified in the enforcement of a

quarantine against the *alfalfa weevil* infested territory in view of the injury caused by the insect and in consideration of the fact that the chief danger of introducing it into this state would be in shipments of hay from the infested territory."

### APIARY INSPECTION REPORT

For Period July 1—September 30.

County—	Box Hives	Frame Hives	European Foulbrood	American Foulbrood
Amite -----	72	35	5	---
Benton -----	130	---	---	---
Bolivar -----	139	648	35	---
Claiborne -----	70	231	---	---
Coahoma -----	54	220	51	1
Copiah -----	153	136	5	---
DeSoto -----	21	20	---	---
Hinds -----	220	279	5	---
Issaquena -----	---	3	---	---
Lafayette -----	474	93	---	---
Leflore -----	88	114	3	---
Lincoln -----	30	1	---	---
Marshall -----	121	123	---	---
Panola -----	309	144	13	---
Pike -----	70	10	21	---
Quitman -----	25	272	22	3
Sharkey -----	86	87	3	2
Sunflower -----	147	350	39	3
Tallahatchie -----	178	206	24	---
Tate -----	118	37	---	---
Tunica -----	33	204	31	---
Walthall -----	21	7	---	---
Warren -----	89	456	3	1
Washington -----	36	1627	34	77
Yazoo -----	66	142	39	---
Total-----	2750	5445	333	87

It is gratifying to note in the above report that American Foulbrood is not widely spread in the State, as in the total of 8195 hives inspected during the past quarter only 10 hives with this disease were found outside of Washington County, which contained 77 infected colonies.

## REPORT OF THE NURSERY INSPECTOR

For the Quarter Ending September 30, 1922

During this quarter 39 certificates were issued to agents or salesmen as required by Rule 34-B, recently adopted by the Plant Board.

Number of nurseries inspected.....	123
Acreage in nurseries inspected.....	1,241

## Amount of Nursery Stock Inspected

Grafted and budded pecans .....	268,885
Seedling pecans .....	581,000

Total Pecans..... 849,885

Citrus trifoliata .....	53,435
Orange .....	25,936
Grapefruit .....	1,087
Miscellaneous citrus .....	2,325

Total Citrus..... 82,783

Apples .....	6,712
Pear .....	13,056
Japanese persimmons .....	1,651
Peach .....	27,949
Grape .....	16,450
Fig .....	7,954
Strawberry .....	4,726,500
Miscellaneous fruit .....	16,661

Total Fruit Stock (Citrus excluded)..... 4,899,676

Rose .....	185,083
Miscellaneous ornamentals .....	2,189,346

Total Ornamental Stock..... 2,374,429

Grand Total of Plants Inspected During Quarter..... 8,206,773

The number of acres of nursery stock inspected as well as the number of plants inspected during this quarter is considerably higher than for the inspections made during the past quarters. This increase in acreage and the number of plants is due to the fact that a number of people in North-Central Mississippi are getting into the strawberry business on a large scale. Hundreds of acres of strawberries in this section were inspected during this quarter, and this helped to bring the total up to 1,241 acres.

## QUARANTINE INSPECTION REPORT

For Period from July 1, to September 30, 1922

(By Geo. F. Arnold, Quarantine Inspector)

## Ships and Vessels Inspected:

From foreign ports -----	11
From U. S. ports -----	---
Total -----	11

## Parcels Inspected:

## Arriving by water—

Passed -----	---
Treated and passed -----	---
Returned to shipper -----	---
Contraband destroyed -----	3
Total -----	3

## Arriving by land, express, freight, wagon, etc.—

Passed -----	32
Treated and passed -----	---
Returned to shipper -----	2
Contraband destroyed -----	1
Total -----	34

## Arriving by mail—

Passed -----	65
Treated and passed -----	1
Returned to shipper -----	6
Contraband destroyed -----	---
Total -----	72

Grand Total of parcels inspected ----- 121

Number of parcels on hand September 30, 1922, pending  
determination as to final disposition -----

Total parcels passed -----	108
Total parcels treated and passed -----	1
Total parcels returned to shipper -----	8
Contraband destroyed -----	4
Grand Total -----	121

## CITRUS CANCKER REPORT

July 1st to September 30th, 1922

Number of counties in the state which have at one time or another since 1916 shown canker-----	4
Number of counties showing canker July 1-September 30-----	1
Number of grove trees inspected July 1-September 30-----	44,435
Number of nursery trees inspected July 1-September 30-----	29,578
Number of <i>C. trifoliata</i> inspected July 1-September 30-----	44,088
Total number of grove trees found infected June 1, 1916, to September 30, 1922 -----	3,101
Total number of nursery trees found infected June 1, 1916, to September 30, 1922 -----	51,167
Number of properties infected during 1917-----	47
Number of properties infected during 1918-----	14
Number of properties infected during 1919-- -----	4
Number of properties infected during 1920-- -----	0
Number of properties infected during 1921-----	1
Number of properties infected during 1922-----	2
Number of new properties infected during 1917-----	12
Number of new properties infected during 1918-----	1
Number of new properties infected during 1919-----	0
Number of new properties infected during 1920-----	0
Number of new properties infected during 1921-----	1
Number of new properties infected during 1922-----	2
Total number of properties found infected June 1, 1916, to September 30, 1922 -----	124
Total number of properties declared no longer danger centers--	122



# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

## OF MISSISSIPPI

VOL. 2

JANUARY, 1923

No. 4

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

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# The Florida Method of Boll Weevil Control

*By Clay Lyle*

Since the publication of the last issue of the *Bulletin*, an improved method of boll weevil control has been announced by the State Plant Board of Florida. This new method is the result of investigations and experiments conducted by Mr. Geo. D. Smith, Associate Entomologist of the Board. A detailed report covering these experiments has been published in the October number of the *Quarterly Bulletin* of the State Plant Board of Florida, and also as *Bulletin 165* of the University of Florida Agricultural Experiment Station.

Briefly, the new plan is:

1. The complete removal of all squares from the cotton plant when practically all weevils have emerged from winter quarters—about June 5 in North Florida.
2. Followed by a thorough application of calcium arsenate or lead arsenate, using a good hand dusting machine.

A summary of the main points stressed in the bulletin follows:

The operations named above practically rid the fields of weevils in all stages and the cotton grows unmolested until the late summer migration begins. However, by this time the majority of the bolls are more than half grown and the migrating weevils turn their attention chiefly to the squares, so that little damage is done in this way.

Hibernation experiments conducted for a number of years at various points in the South, showed that approximately 99 per cent of the weevils have emerged from their winter quarters by June 5. Stripping and burning all the squares on this date not only destroys all immature stages of the weevil, but many adults are caught in the same operation while feeding inside the shucks of the squares. For this reason, the sacks used in gathering the squares should be made of tightly woven cloth and close with drawstrings to prevent the weevils escaping. Any weevils remaining after the squares are stripped will feed in the tender buds of the plants and be destroyed by the single application of arsenical dust.

As early fruiting has been considered of so much importance in getting ahead of the weevil, many farmers hesitate to strip these first



squares, averaging about two large ones to the plant on June 5. However, experiments showed that stripping really had the effect of stimulating or accelerating the fruiting to such an extent that the yield would probably be increased even if no weevils were present. Under normal conditions, while the cotton plant is setting and maturing the bottom bolls there is little tendency to produce squares and blooms, hence the middle and top crops are not set until late in the summer. But the abnormality of stripping so accelerates the fruiting that squares are produced uniformly all over the plant and the bottom, middle, and top "crops" develop practically at the same time, all reaching such a stage of maturity as to escape much damage from the migratory weevils. This simultaneous development and maturity enables the farmer to gather his crop almost entirely in one or two pickings and permits the early destruction of the stalks in the fall as an additional measure against the weevil.

The 1922 experiments were carried on in three counties in North Florida. Twenty fields, containing 133.51 acres and consisting of sandy loam soils, were used in making the tests. With few exceptions, no fertilizer was applied and large yields could not have been obtained even with no weevils present.

The 20 treated fields averaged 439 pounds of seed cotton per acre, while the untreated check fields averaged 164 pounds, an increase of 275 pounds to the acre. At 21 cents a pound for lint cotton and \$32 a ton for cotton seed, the average value of the crop on the treated fields was \$35.42 per acre, while the average crop on the untreated fields was valued at \$13.20, a difference of \$22.22 per acre. The cost of controlling the weevil per acre averaged \$1.57 on the 20 fields. Deducting this cost leaves an average profit of \$20.65 per acre from using the new method.

A greater average profit per acre would have been shown but for the fact that on 3 of the 20 fields the squares were purposely removed about May 18 to see the effect of too early stripping. These fields were reinfested by weevils emerging later and the yield and profit reduced.

The more fertile the land, the better the stand and the cultivation, the greater was the profit per acre resulting from the treatment. On one plantation where 9 fields containing 95.1 acres were treated, the profit per acre varied from \$39.16 to \$14.38, showing a total net profit of \$2,130.30 on the 95.1 acres. The cost of treatment on this plantation varied from \$1.12 to \$1.60 per acre, with an average cost of \$1.34.

Picking off the squares was done entirely by negro women and children and labor for this was charged at 6 cents an hour. Labor for applying the poison was charged at 10 cents an hour, and calcium arsenate at 10 cents a pound, considerably less than it will cost during 1923. From 5 to 7 pounds per acre were applied.

Growers are warned against applying the poison by sifting it from cloth sacks or any other method except with a hand dusting machine that will deliver a strong steady stream. One duster for each 10 acres is advised. Power dusting machinery is not suited to this method as the poison must be forced into the terminal bud of every plant. With a hand duster one man can apply the poison to 4 or 5 acres a day. Night applications are not advised, as the work can be done better during the day and dew is not essential to successful results, though the poison sticks better if dew is present.

A very light rain after the poison is applied, especially if falling slowly, does no harm and may be an advantage in sticking the poison to the plants. A hard or long-continued rain immediately after poisoning will necessitate another application, though if no rain falls for two or three days re-poisoning will not be necessary, as experiments showed that when stripped plants were poisoned 82% of the weevils died the first day, 96% were dead the second day, and over 99½% the third day.

### KEEPING CAMPHOR SCALE OUT

The discovery of the so-called Japanese Camphor Scale, *Pseudanidia duplex* (which really attacks more than a hundred different plants including citrus, Japanese persimmon, roses, grapes, and others of more importance than camphor), in citrus groves near Mobile and at Grand Bay, Alabama, last summer, revealed another source from which this serious pest might enter Mississippi. Many Satsuma oranges from these sections are sold in the coast towns of Mississippi, making it easy to introduce the scale. Inspections of fruit stands in these towns in December showed camphor scale-infested fruit for sale at several places. This fruit had been brought from Alabama in trucks chiefly, this method of transportation making it harder to intercept the shipments.

However, with the co-operation of the Jackson County Board of Supervisors, all citrus-hauling trucks from Alabama were stopped and inspected before being allowed to cross the ferry on the Pascagoula river, and in this way a number of infested loads of fruit were kept out of the State. The illustration on the next page shows a shipment confiscated at Biloxi before the inspection was started at Pascagoula. This shipment was burned.

The State Plant Board is considering the advisability of a quarantine against the fruit from the infested citrus sections and it is believed that during the next season it will be possible to prevent any of the scale-infested fruit from entering Mississippi. On account of the

citrus canker quarantine, citrus plants from these sections are already prohibited from Mississippi except under special precautions and conditions



Fig. 1. Satsuma oranges from Alabama infested with Japanese Camphor Scale, *Pseudaulnuxia duplex*. Intercepted and burned at Biloxi in December

### "DAMPING OFF"

By D C Neal, Plant Pathologist

One of the most troublesome diseases of the vegetable grower, who is compelled to use hotbeds and cold frames to grow his early plants, is one known as "Damping Off." The young plants become affected at the surface of the ground, the stems rot off and the plants fall over and die. Most of the plants that are started in seed beds are subject to this disease, including eggplant, pepper, tomato, cabbage and cauliflower. Eggplants and peppers are particularly susceptible to the disease, sometimes so seriously that nearly all the plants in a bed will die. The same disease also occurs on some plants in the field, the disease of cotton known as "Sore Shin" being a good example.

The disease is caused by a fungus which lives normally in the soil. This fungus attacks the young plants during the first few weeks of their growth, killing and rotting the stems. The disease may affect only a few scattering plants in a bed or it may spread rapidly over rather large areas if the conditions for its development are right.

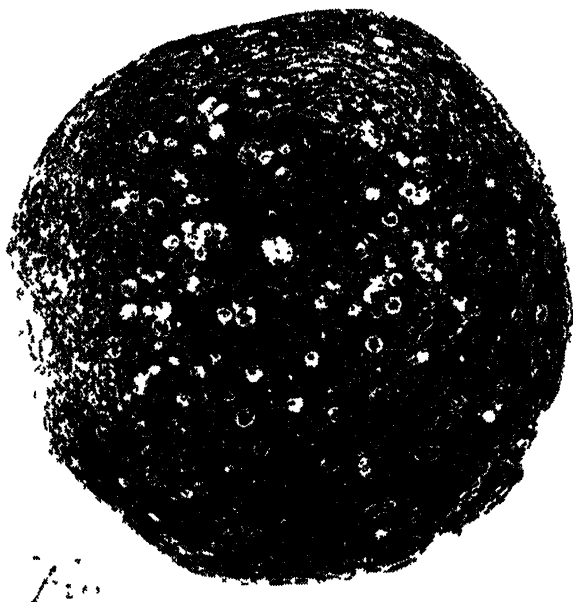


Fig. 2. A scale-infested Satsuma from pile shown on opposite page.

The fungus causing the disease is present in nearly all soils so that it is almost impossible to obtain soil that is free of it. The disease, however, can usually be held in check if the proper precautions are taken. Some of these are as follows:

- (1) If possible, fresh soil should be obtained for the seed bed. Fresh soil usually contains less of the fungus than soil that has been used in a seed bed the previous season. If for other reasons it seems advisable to use soil that has been used before, this soil should be thoroughly soaked about six weeks before planting and kept in a moist condition. Do not let the soil become thoroughly dry and then plant the seed immediately after wetting as this usually results in a very serious epidemic of "damping off".

- (2) It is a good practice to add sand to the seed bed soil as this makes it looser and it will dry out much faster. "Damping off" is always worse in a wet heavy soil.

- (3) After the plants are up, water should be used very sparingly for the first few weeks. Only enough should be used to keep the



Fig. 3. Japanese Camphor Scale, *Pseudaulnidia duplex*, greatly enlarged. (By H. L. Dozier, U. S. Bureau of Entomology.)

plants from wilting. This is very important and should always be carefully observed.

(4) The seed should be planted in rows about two inches apart in order to allow frequent cultivation. After the plants are up the soil should be stirred frequently. This allows the upper surface to dry out and prevents the spread of the disease. There will not usually be much "damping off" if the surface of the soil is kept loose and dry.

(5) A layer of sand added to the surface of the beds is often beneficial. This dries out more readily than the soil and thus checks the trouble.

(6) The plants should be given plenty of sunlight. The disease is always worse in a partly shaded place or during periods of cloudy weather.

Plenty of sunlight, the use of as little water as possible, and frequent cultivation to keep the dust mulch on the surface, will usually hold the disease fairly well in check.



Fig. 4. "Damping Off" of tomatoes. (Ohio Exp. Sta.)

#### THE TOBACCO LEAF-FOLDER OF PORTO RICO ATTACKS TOMATOES IN MISSISSIPPI

*By J. M. Langston.*

On October 11, 1922, Mrs. C. L. Bommer, Ocean Springs, Mississippi, sent to this office some larvæ and adults of an insect found feeding on tomatoes. Mrs. Bommer wrote: "The worms roll up the leaves of my tomatoes. The specimens of rolled-up leaves are poor now as the worms ruined the leaves so that they cannot find a good leaf to

roll up nicely". When received a number of the larvæ had rolled themselves up in the paper in which the plants were wrapped and were preparing to change to the pupa stage. The first adult from this lot emerged in the cage in the laboratory on November 2nd, followed by 4 others on November 9th. Specimens were sent to Dr. L. O. Howard, Chief of the United States Bureau of Entomology and were determined by Dr. H. G. Dyar of the United States National Museum as *Pachyzancla periusalis*, Walk. This is the Tobacco Leaf-folder of Porto Rico and is its first recorded appearance in Mississippi.

In Dyar's List of Lepidoptera this species is recorded as occurring in the United States and Brazil. Grosbeck in his Insects of Florida, Part IV, 1917, states that it feeds on tomato in Florida. In a personal letter to Professor R. W. Harned, Mr. Thomas H. Jones, Entomologist, Louisiana Experiment Station, in writing of this insect says: "I am quite positive that I have taken larvæ on eggplant in Louisiana." Mr. R. T. Cotton in the Report of the Porto Rico Experiment Station for the year ending June 30, 1917 says that it is of widespread occurrence in Porto Rico, where it feeds on tobacco, eggplant, tomato, and also weeds belonging to the nightshade family. This includes *Solanum nigrum*, the common nightshade of Mississippi. The following notes on the life history of this insect in Porto Rico are taken from the above mentioned article by Mr. Cotton and from U. S. Department of Agriculture Bulletin 192 by Mr. Thos. H. Jones.

The adult is a moth belonging to the family Pyralidæ. It has a wing expanse of about  $\frac{3}{4}$  of an inch and is brownish-grey in color with a slight golden hue. The wings are marked above by three dark wavy lines running crosswise. The adult lays eggs singly on the under side of the leaves. These hatch in 5 to 8 days into small yellowish larvæ which feed on the leaf tissue near the midrib. As it grows larger the larva spins a silken shelter under which to feed. Later it folds over a portion of a leaf to form a shelter in which to hide and feed. As the larva grows larger it also grows darker in color and when full grown is about  $\frac{3}{4}$  of an inch long, of a pale yellow color with two reddish-brown stripes down the back, and reddish-brown markings on the sides. About 18 or 20 days after hatching the larva wraps itself more securely in a rolled-up leaf, usually using one end of the feeding shelter for this purpose, where it remains about three days before changing to the pupal stage. In about 12 days or more the adult moth emerges. The entire life cycle requires about seven weeks in Porto Rico, but the generations overlap so that all stages of the insect may be found at the same time.

In Porto Rico this insect is a pest of tobacco when the plants are young but after the plants are older it prefers to feed on its native wild food plants. On tobacco these insects are killed by the arsenical sprays applied for the control of flea-beetles. It has also been recom-

mended that all weeds belonging to the nightshade family be kept down in and near the tobacco fields. The same methods of control could doubtless be used if this insect should prove to be a pest in Mississippi. When feeding on tomatoes the arsenicals recommended for other tomato insects would very likely be effective for control of this pest. Keeping down all weeds belonging to the nightshade family such as the common nightshade, horse nettles, thorn apples, apple of Peru, ground cherry, etc., in the neighborhood of tomato fields would be an important preventive measure against this insect. It is possible that the Irish potato might be attacked also as it belongs to the same family as the wild host plants of the insect, but if this should happen the pest would be at least as easily controlled as the Colorado potato beetle.

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## THE PINK BOLLWORM SITUATION

*By Clay Lyle.*

The South enters the year 1923 under apparently more hopeful conditions in regard to the pink bollworm question than at any time since its discovery in the United States. During 1922 this pest was found only in the extreme western part of Texas. While it is possible that it may still be present in former infested territory, extensive scouting in these places has given negative results.

Non-cotton zones, maintained for two years in Southwestern Louisiana and Southeastern Texas, have apparently eradicated the pest from those sections. Such careful and complete clean-up work was done around Ennis, in Ellis County, and Marilee, in Grayson County, where the pink bollworm was found in November, 1921, and also around Shreveport, Louisiana, where the pest was discovered in the fall of 1920, that no sign of its presence has been discovered this season at these places.

On account of an infestation in Mexico just across from the Big Bend district, government officials assert that non-cotton zones would not be practicable in that section, as a reinfestation would almost certainly occur. Until steps are taken to combat the pest on the Mexican side, it is probable that eradication in the Big Bend will not be pushed, as the territory is well-quarantined and the character of the country would otherwise make it difficult for the pest to spread.

Though a large amount of scouting has been done in Texas, the immense size of the state makes it almost impossible to adequately cover the territory with the limited force of the Federal Horticultural Board. Hence it is possible that isolated infestations may escape dis-



covery, though it is not believed likely. Nevertheless, the State Plant Board of Mississippi, acting on the principle that "it is better to be safe than sorry", will continue to maintain its present strict quarantine against seed cotton, cotton seed, and cotton seed hulls from Texas, New Mexico, Oklahoma, and Western Louisiana.

## THE CITRUS CANCKER SITUATION IN MISSISSIPPI DURING 1922

*R. P. Barnhart.*

During the fall and winter of 1919 and all of 1920, the citrus canker situation was so favorable that those actively engaged and those interested in the eradication of this serious menace to the citrus industry were quite hopeful that the fight had been won. During this time not a single citrus plant was found infected with the disease, although, at no time was there a let-up in the inspection work along this line. This favorable condition continued through the summer of 1921.

In September, 1921, one infected grapefruit tree was found on the property of the Ft. Bayou Fruit Company, ten miles north of Ocean Springs, by Inspector R. P. Barnhart. This tree was burned immediately, and the ground around it fired and sprayed with a formaldehyde solution. All other trees have been inspected at regular intervals since the finding of this infection and no citrus canker has been found. As an added precaution, all citrus trees within a radius of three miles of this property were immediately inspected and no citrus canker found.

As this infection occurred on a property which had, at no previous time, had citrus canker, and had not even been classed as suspicious, and as there had been no additions made to the original planting, we were at a loss to account for the infection. One possible source of this infection was suggested by the manager of this property, when he told of three fruit buyers who came there in November, 1920, by automobile from a citrus growing center of a neighboring state. Two of the men stood in the foliage of this tree, which was later infected, while the third took a picture of them. It is quite possible to carry the organism of this disease on the wearing apparel, and it might have been brought to this property in this manner. Too much cannot be said against the practice of allowing visitors free access to valuable citrus plantings.

In view of the fact that citrus canker had been known to science but a little more than seven years and that this period had given us all the information available from any source, the recurrence of this

disease after a period of more than two years, suggested to us the necessity of another general survey of all the citrus trees in the citrus growing belt of Mississippi, which includes Stone, George, Jackson, Harrison, Hancock, and Pearl River Counties. This general survey was started May 1, 1922, and was continued during May and June by a force of twelve competent inspectors. The territory mentioned above was covered completely and thoroughly with the exception of that portion of Jackson County bounded by Harleston on the north, the coast line on the south, the Alabama line on the east, and the Pascagoula River on the west, a small portion of Pearl River County, and the town of Wiggins in Stone County. The total number of citrus trees, orchard, nursery, etc., inspected during this sixty day period was approximately 280,000.

As a result of this survey, an infection was found on the farm of J. T. Vise at Agricola, during June, by Inspectors R. C. Price and W. L. Blain. Ten seedling citrus trees, all infected, were found on this property. They were burned and the premises disinfected. This property is twelve miles distant from any commercial citrus planting, either nursery or orchard. The source of this infection has not been determined. The trees were sprouts from stumps that were left after the freeze during the winter of 1916. It is possible that citrus canker might have been present before the freeze, in which case the organism could have been present in the soil after the freeze and later infected these trees.

The extra inspectors were not available for this work after June 30, so the work was continued with the regular force of four full time inspectors, with the occasional assistance of other Plant Board inspectors when opportunity occurred for helping.

During September, October, and November, citrus canker was found in the negro section of Moss Point on the properties of Polly Allen, Henry Green, M. Harris, Tom Short, Robert Sharper, and J. W. Green. The area embracing these properties was very small and is in the center of a former citrus canker territory, and the infection no doubt is traceable to the infected soil. This infection is not near any commercial groves or nurseries. Inspectors Alfred Lutken and R. P. Colmer found this infection. There were twenty trees in all, which were promptly burned and the properties disinfected. All other citrus plants within a radius of three miles were inspected and no citrus canker found.

During December, the property of W. W. Pace, one and one-half miles west of Wiggins, was found to be infected. There were 243 *Citrus trifoliata* plants on this property. The infection was found by Inspectors E. K. Bynum and R. P. Barnhart on visiting this property after a request for an inspection. These plants were all burned and the usual precautions taken. This infection has been directly traced

to some bud wood used in budding this stock to Satsuma orange and grapefruit. This *Citrus trifoliata* had been discarded as nursery stock and there were no other citrus plants on this property, nor any commercial groves or nurseries in the immediate vicinity. All properties within a radius of three miles were inspected and no citrus canker found.

In reading this report, note should be made that no infection was found in 1922, in or near a commercial grove or nursery, and that all trees found infected were either seedling orange, seedling grapefruit or *Citrus trifoliata*, and that all infected trees were burned.

## NOTES ON THE AUSTRALIAN TOMATO WEEVIL

(*Desiantha nociva*)\*

By E. K. Bynum.

Since there is little available literature dealing with this insect, this article is intended to give the farmers of Mississippi and others the benefit of the information that has been collected up to this time in order that they may be better able to look for the pest in other parts of the State. The data from experiments now running will be published when they are completed, but will be too late to be of any value in scouting for the pest this season.

The Australian Tomato Weevil was found at McHenry during the latter part of March, 1922. It was not known to occur in the United States previous to that time. Since then it has been found on five other properties in the vicinity of McHenry, and also near Saucier, Lyman, and Wiggins. Along the coast infestations have been found near Long Beach, Gulfport, Biloxi, and Ocean Springs. Thorough scouting will doubtless reveal its presence at other points.

Observations on the work of this insect are not yet sufficient to permit the naming of a complete list of host plants. However, serious damage has been noticed on turnips, tomatoes, and potatoes, while a number of other truck and garden crops have been attacked.

All parts of the plant above the surface of the ground are subject to the attacks of this weevil in both the larval and adult stages, though the foliage seems to be preferred. The feeding injury caused by the larva and the adult is very similar, appearing as small holes in the

\*This is the name now being used for this insect by the U. S. Bureau of Entomology and National Museum. Some authorities think that it should probably be placed in another genus and that it is not this Australian species.

foliage, or parts of the plant may be entirely eaten away. Where plants are heavily infested the foliage may be skeletonized. Small potato plants have been observed to be injured along the stem making small scars, and in severe infestation the stem may be severed.

When the garden of W. D. Ashley at McHenry was first visited the adults were collected with little difficulty. As the season advanced, the adults seemed to leave the fields. It is hardly probable that the mortality reduced the number of adults so much since the weevils in cages did not show a high mortality rate. The weevils in cages fed less and less as the season advanced and during the hot summer months practically stopped eating. On May 25th the last weevil was collected in the field. During the summer months frequent scouting was done to determine if the weevils were present, and if not, when they returned. In the early fall it was noticed that the weevils in cages were feeding more than during the summer months. On November 1, three adult weevils were collected in the Ashley garden and since that time there has been no difficulty in finding them.

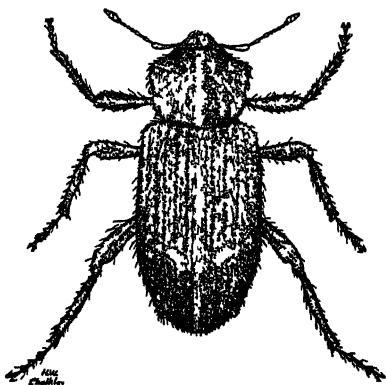


Fig. 5. The Australian Tomato Weevil, *Desiantha nociva*, enlarged about 4 times.

Observations indicate that this insect is not attracted to lights. An automobile was placed within eight or ten feet of the ends of rows where the insect was known to be present in numbers, but not a single weevil was found on a sheet lying in front of the lights. Light seems to have a repelling effect in fact, as the weevils usually crawled rapidly away when a number were placed within a few inches of a flash-light.

So far the life history has not been worked out in the United States but this work is under way at present. Only a few brief statements can be given in this article concerning the different stages of the insect. It is thought that oviposition begins rather early in the fall as



Fig. 6. Turnips injured by the Australian Tomato Weevil, *Desiantha*

full grown larvæ were found in the field on December 20, 1922. Eggs are being deposited in numbers in breeding jars at this time (January 21, 1923). The eggs are round and of a creamy white color. They are placed singly on the soil in breeding jars, occasionally on the food and on the sides of the jar. It seems probable that they are also deposited just beneath the surface of the soil.

When full grown the larva is about one-half inch in length and one-fourth as broad. When the larva first emerges from the egg it is white but later takes on a greenish color. The head is brown and two brown markings are found immediately behind the head, one on each side. When very small the larvæ may remain on the host plant

both day and night, as a goodly number have been collected during the day sticking tightly to the under side of the foliage. At this time the injury may be confined entirely to the lower surface of the leaves. As they grow the larvæ eat through the leaves and in severe attacks only the leaf veins are left. After the larvæ are a few days old they seek shelter during the day and come out in search of food at night. During the day many of them have been found lying on the soil at the base of food plants, while others are found hiding under any rubbish that may be present or in cracks in the soil. When at rest the larvæ have that characteristic curve of the body that is found among other weevil larvæ.

When the larva is ready to pupate it burrows into the soil and constructs a pupal cell about one inch below the surface of the soil. Here the larva is transformed to the adult which comes out and attacks the plants again.

The adult weevil is about three-eighths of an inch in length and about two-fifths as wide. It is of buff color with a lighter oblique mark on each wing cover which forms a characteristic V on the elytra. In fresh specimens there is also a light median line on the thorax. During the day the adults are inactive and due to their color are seen with difficulty. They may be found hiding at the base of the plants under any kind of rubbish or pebbles that may be present. If they do not find shelter near the plants they may burrow in the loose soil. At night the weevils become active, emerge from their hiding places and begin their search for food. They usually begin feeding shortly after sundown and may remain on the plants all night. Very few have been observed on the plants after sunrise and these appeared to be hiding in inconspicuous places. When a field is heavily infested adults can easily be found with the aid of a flashlight. While making observations at night many of the weevils have been seen to drop to the ground when the light was flashed on them.

It seems most likely that fertilization takes place at night, but observations so far have failed to reveal a single pair of weevils in copulation.

It is not known how long the adults of this insect will live but experiments that have been conducted indicate they may live for several months. Two weevils collected in the field before May 25, 1922, were last noticed in the cage on January 12, 1923.

The adults of this insect apparently have well developed wings but only one has been observed to fly, and then only from one side to the other of a small cage while it was being examined in day time. They can crawl rapidly and can no doubt travel a considerable distance in this way.

No definite information is available at this time concerning methods of control.



Fig. 7. Injury to turnip foliage and root by the Australian Tomato Weevil, *Desiantha nociva*

#### PECAN SPRAYING SCHEDULE FOR SCAB CONTROL IN MISSISSIPPI

*By D. C. Neal, Plant Pathologist.*

Owing to the numerous inquiries that are now being received by the Plant Board and Experiment Station for information regarding the spraying of pecan trees for the control of scab, the following sug-

gestions as to the proper spraying schedules, materials, and equipment appear advisable.

Spraying	Time to Spray	The Spray Solution to Use
First	While trees are dormant— Jan. 15 to Feb. 1.	Lime-sulfur concentrate 1 gal. to 8 gals. of water.
Second	While trees are dormant— Feb. 20 to March 5.	“ “ “
Third	As soon as young nuts have set.	Bordeaux mixture 4-4-50, 1 lb. powdered lead ar- senate, 1 lb. fish oil soap
Fourth	3 to 4 weeks after third spraying.	Bordeaux mixture 4-4-50, plus 1 lb. fish oil soap.
Fifth	3 to 4 weeks after fourth spraying.	“ “ “
Sixth	3 to 4 weeks after fifth spraying.	“ “ “

The above information is based partly on experiments carried on by the Department of Plant Pathology of the Mississippi Experiment Station in the coastal section of the State during the 1921-22 seasons; and on information obtained by the U. S. Department of Agriculture; and from the tests of a number of commercial growers of pecans throughout the State.

It appears advisable to emphasize the fact that a definite spraying program cannot be given, especially as to the time and number of applications of the Bordeaux mixture. These applications, as pointed out in former publications from this office and the Experiment Station, will depend upon the amount of rainfall in a given locality. During seasons of abundant rainfall, the interval between the applications of the Bordeaux mixture must be materially reduced, and in some instances it may be necessary to add an additional application or two, or even extend the schedule beyond August 15, the time recommended for discontinuing spraying operations. The critical periods for scab control and the time the pecan grower should watch his grove carefully are (1) the time the young nuts have formed so as to apply the first protective spray immediately after pollination is complete, and (2) the rainy season which usually takes place during the last of May up to July 15. The character of the season determines to a large degree the prevalence and dissemination of the fungus, and if protective coatings of the Bordeaux are kept on the nut clusters during this period, the control of the disease can be effected.



The dormant applications of lime sulfur are included largely to eradicate any spores of the fungus which may be harboring or surviving the winter on surfaces of the twigs, the fruit spurs, or in the crevices of the bark. If any dead branches, twigs, old husks, or nut clusters are found on the trees, these should be pruned out before applying the lime-sulfur. The lime-sulfur concentrate which is usually purchased on the market should test around 33 to 32 degrees Baume by the standard hydrometer or specific gravity spindle. Hydrometers may be purchased from any druggist for 75 cents or a dollar, and any grower can test this lime-sulfur concentrate in order to properly dilute the solution before spraying his trees. The following table gives the dilutions for dormant spraying according to the hydrometer reading or specific gravity of the concentrate.

Hydrometer reading (Degrees Baume on Spindle)	No. gallons water to 1 gallon concentrate.
35	9
34	8 $\frac{1}{4}$
33	8 $\frac{1}{2}$
32	8
31	7 $\frac{1}{2}$
30	7 $\frac{1}{4}$
29	6 $\frac{3}{4}$
28	6 $\frac{1}{2}$
27	6
26	5 $\frac{3}{4}$

In spraying pecan trees of considerable height, it is necessary to use power sprayers, with specially constructed hose and spray guns; and pressures ranging from 250 to 300 lbs. must be maintained. Careful and thorough spraying must be given. The nut clusters, twigs, and branches should be thoroughly covered, but the tree should not be drenched with the liquid. The attitude of the grower toward these points will determine to a large degree whether his spraying will be effective so far as scab control is concerned. For further information address, The State Plant Board, Plant Pathology Section, A. & M. College, Mississippi.

## THE ARGENTINE ANT CONTROL CAMPAIGNS OF 1922

*By M. R. Smith.*

The first Argentine Ant Control Work conducted by the Mississippi State Plant Board was begun in the fall of 1920 when co-operative campaigns were put on in four of the towns in the state. In 1921 a number of towns requested estimates of the cost of a campaign but only seven of these decided to put on campaigns. Due to an increase in publicity and also to the fact that the former campaigns had been successful, there was a much increased demand for estimates in 1922. Surveys were made in the following towns at the request of the city officials: Pascagoula, Oceans Springs, Biloxi, Gulfport, Pass Christian, Hattiesburg, Laurel, Meridian, Aberdeen, Starkville, Kosciusko, Durant, Jackson, Vicksburg, Hazlehurst, Crystal Springs, Osyka, Woodville, McComb, Columbus, Tylertown, Tillatoba, Amory, West, Oxford, Greenwood, Clarksdale, Ellisville, Terry, Mississippi City, Canton, Summit, Magnolia, Greenville, Bay St. Louis, Fayette, Goodman. This represents a total of 37 towns of the 62 known infestations in the state.

Seventeen of the towns just mentioned conducted campaigns. Two of the towns, namely, Durant and Woodville, have had campaigns successively for the past three years, while Aberdeen, Hazlehurst, Columbus, and Gulfport have had campaigns for the past two years.

The infestation in some of the towns is very small, only a few blocks or a minor portion of the town; in others the infestation is solid throughout the town and even extends past the incorporation line into the country.

Below is given a list of towns that put on campaigns during the fall of 1922 with the estimated number of cans required and the estimated cost. From these figures it can be seen that the towns in Mississippi spent approximately \$20,000 during 1922 in fighting Argentine ants; this of course does not include the expenses of the State Plant Board.

Town—	Number of Cans Required	Cost.
Woodville -----	8,900-----	\$ 641.60
Hazlehurst -----	11,600-----	817.30
Durant -----	6,200-----	462.20
Greenwood -----	19,000-----	1,276.79
Greenville -----	4,000-----	286.25
Laurel -----	38,000-----	2,447.25
Hattiesburg -----	13,000-----	881.26
Biloxi -----	1,700-----	142.70
Gulfport -----	4,600-----	367.55

Summit -----	7,000-----	501.79
Fayette -----	500-----	43.71
Jackson -----	50,000-----	3,365.00
Meridian -----	60,000-----	4,500.00
Starkville -----	5,000-----	356.50
Aberdeen ---	18,000-----	1,271.80
Columbus -----	6,000-----	438.55
Ellisville -----	6,000-----	428.90
17	259,500	\$18,229.15

The demand for the ant work is steadily increasing from year to year. It is entirely a business proposition with every town concerned and the fact that a number of towns are continuing the campaigns year after year shows that the people in these towns consider their money wisely invested.

### ANNUAL CONFERENCE NOTES

The annual conference of the State Plant Board, held at the A. & M. College on November 27, 28 and 29, was one of the most interesting and instructive meetings in the history of the organization. All inspectors of the Plant Board and agents of the United States Bureaus of Entomology and Plant Industry in Mississippi were present, together with representatives from other states. All phases of the insect pest and plant disease problems confronting the people of Mississippi were discussed.

The pink bollworm situation, as described by K. H. Townsend of Houston, Texas, chief inspector of pink bollworm scouting for the Federal Horticultural Board, is very promising as this destructive pest was found during 1922 in only one locality—the Big Bend section of West Texas. It is hoped that it has been completely eradicated in the other regions formerly infested, but Mississippi will continue to insure the safety of her cotton crop by maintaining a quarantine against Texas, New Mexico, Oklahoma, and Western Louisiana.

J. E. Graf and Neale F. Howard of Birmingham, in charge of Mexican Bean Beetle investigations for the Bureau of Entomology, also brought cheerful news in the statement that this pest, which is expected in East Mississippi at any time, was damaging cowpeas and soybeans less than had been expected when it first appeared, though garden beans continue to be seriously injured and completely destroyed in many cases.

The next period was given to an interesting lecture on control methods for important peach pests by Oliver I. Snapp, in charge of the

Peach Pest Laboratory at Fort Valley, Georgia, who became well-known to the fruit growers of this state during his three years work as extension entomologist of Mississippi. Special attention was devoted to recent experiments in combatting the peach tree borer with paradichlorobenzene, a practical and almost perfect control for this serious pest.

Prof. P. P. Garner, State Commissioner of Agriculture and chairman of the Plant Board, then outlined the work of the various divisions of the State Department of Agriculture, and commented on the fact that Mississippi is wholly dependent upon her agricultural resources. Stressing this statement, he concluded his address with an inspiring appeal to the Plant Board inspectors, urging them to spare no efforts in helping the farmers of the state get the greatest possible returns from their one source of wealth—the soil.

An able discussion of the sugar cane moth borer was led by Inspector E. K. Bynum and others. This pest, so destructive in Louisiana and the West Indies, has been discovered in portions of seven counties in South Mississippi. Quarantines prohibiting the shipment of sugar cane from these sections were advised, and every possible effort will be made to control the borer and prevent further spread.

The Japanese Camphor Scale situation was presented by Dr. H. L. Dozier, a former entomologist of the Plant Board, now in charge of the camphor scale investigations for the United States Bureau of Entomology. This serious pest, which is now found around New Orleans and at two places in Alabama, was discovered at four points in Mississippi in 1921, but was probably eradicated by the Plant Board and no infestation is known in Mississippi at the present time.

An interesting report on Bee Disease eradication was presented by J. L. E. Lauderdale, in charge of that branch. The last apiary inspections made during the summer showed a marked decrease in the amount of European and American Foulbrood since the first inspection in the spring. With better co-operation, much greater control, perhaps complete eradication in the case of American Foulbrood, is expected during 1923.

The Sweet Potato Inspection Service was next discussed from every angle in an effort to remove every hindrance to progress in controlling Stem Rot and Black Rot during the coming year. Experiences related by various inspectors showed that the inspection service had been worth thousands of dollars to potato growers and storage houses during the past season.

K. L. Cockerham, director of sweet potato weevil eradication in Mississippi, presented a report on the operations against that pest in five counties in South Mississippi, showing that while some new in-

festations had developed within those counties, the weevils have been almost completely eradicated from the properties that were first infested, a marked instance being Hancock County where of 67 infested farms in 1918 only three now have weevils.

The Citrus Canker situation was ably handled by R. P. Barnhart, who stated that the recent discovery of the disease in Jackson County was no cause for alarm as the infection was isolated and no danger of a general outbreak.

Professor J. R. Ricks, Director of the Mississippi Agricultural Experiment Stations and a member of the State Plant Board, reported his recent attendance at two conferences on the boll weevil, and discussed some experiment station problems and the necessity of co-operation between Experiment Station and Plant Board workers.

D. W. Grimes, State Nursery Inspector, next discussed the work of that department, showing for comparison good and sorry nursery stock and also specimens of various nursery pests. An outstanding point was his statement that over ten million trees and nursery plants had been inspected in the State during the past season.

The eighteen Argentine ant campaigns conducted by the Plant Board in co-operation with Mississippi towns during 1922, involving an expenditure of nearly \$20,000 by the towns, was the subject of an interesting discussion led by M. R. Smith, Ant Specialist of the Board. Many helpful suggestions were made in regard to methods of conducting future campaigns.

The recent discovery of a number of new plant diseases in the State was discussed by D. C. Neal, Plant Pathologist of the Plant Board and Mississippi Experiment Station, who displayed specimens of "soil rot" of sweet potatoes, "root rot" of sugar cane, and "scaly bark" of citrus trees, none of which were known in Mississippi until last November. Mr. Neal also discussed the advisability of producing wilt-resistant tomato seed for free distribution in Mississippi, a problem which the State Plant Board is considering, as it is the only practical way in which the losses from this disease can be reduced.

The conference also brought out the fact that several serious insect pests had been discovered in Mississippi during the present year for the first time, among them being the chicken tick, a very serious pest in the Southwest, the Australian tomato weevil, which is not known to occur anywhere else in America, the chrysanthemum gall midge, often injurious in the North, the strawberry crown borer, and a new undetermined sugar cane borer. A close watch is being kept on these new pests with a view of preventing their further spread, and if possible, eradicating them.

## NEW PESTS IN 1922

During the past year no less than nine pests were discovered in Mississippi for the first time. Some of these are found in adjacent States and their presence in Mississippi was not surprising. Others occur in rather distant sections of the United States, and one species has never before been reported in America.

Buff-colored Tomato Weevil, *Desiantha nociva*. This was perhaps the most interesting find of the year, and was reported from McHenry, in Stone County, in March. It is a native of Australia and this is its first recorded appearance in America. It has since been found at Long Beach and at Landon, both in Harrison County and not more than 25 miles from the infestation at McHenry.

Fowl Tick, *Argas miniatus* Koch. This pest, the notorious "blue bug" or destructive chicken tick of the Southwest, was discovered in Biloxi in July. Scouting and queries have failed to show it at any other points in the State.

Chrysanthemum Gall Midge, *Diarthronomyia hypogaea*, Loen. Two greenhouses in Mississippi sent in specimens of this pest at practically the same time. Both received their plants from Illinois, though a few days later five infested shipments from Pennsylvania were intercepted.

Strawberry Crown Borer, *Tyloclerma fragariae*, Riley. Only two properties, both in Lauderdale County, are known to be infested with this pest. It probably came from Tennessee.

Pink Sugar Cane Borer, (Undetermined). Inspections made during the summer for the sugar cane moth borer, *Diatraea saccharalis crambidoides*, disclosed the presence of what seems to be a new sugar cane moth borer with a definite pink coloration. It was found only on five properties in Harrison County and as yet has not been determined.

Porto Rican Tobacco Folder, *Pachyzancla periusalis*, Walk. This pest, recently reported from Ocean Springs, is thoroughly discussed in another article in this issue.

Scaly Bark, *Cladosporium herbarum* var. *citricolum*. This citrus disease is rather common in Florida and California but its discovery during the fall is the first record of its occurrence in Mississippi. Little damage is expected from it, as grapefruit and Satsumas, practically the only citrus fruits grown in Mississippi, are not susceptible to it.

Soil Rot, *Cystospora batata*. This rather serious disease of sweet potatoes in New Jersey, Delaware, and Maryland was discovered in

Lee County during the fall. However, it spreads very slowly in the soil and may not become serious in Mississippi unless transferred in other ways.

Root Rot of Sugar Cane, *Marasmius plicatus*. Though prevalent in Louisiana, this disease was first reported in Mississippi from Webster County during the fall. About 10% of the plants were infected, though more damage is often caused in Louisiana.

### A NEW BULLETIN ON BARK BEETLES

The Mississippi Agricultural Experiment Station has just received from the printer its latest publication, Technical Bulletin No. 11, "Mississippi Bark Beetles", which is the largest bulletin ever published by the Station. The bulletin is the result of work done by Dr. M. W. Blackman, Professor of Forest Entomology in the New York State College of Forestry, who spent seven months in Mississippi studying the forest pests of the State and scouting for new pests in co-operation with the State Plant Board.

This bulletin is for free distribution, but on account of its technical nature it will be of value chiefly to entomologists, though the paragraphs describing the work of the various forest pests and giving control measures for them will be of considerable interest to those engaged in lumbering operations or possessing large tracts of timber. Anyone desiring a copy should write the Agricultural Experiment Station, A. & M. College, Miss.



# THE QUARTERLY BULLETIN

## STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
 HUNTER H. KIMBALL.....Associate Editor  
 CLAY LYLE.....Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

### THE CITRUS CANKER SITUATION IS GOOD

Elsewhere in this issue of the Quarterly Bulletin will be found a brief report on the citrus canker situation in Mississippi by R. P. Barnhart, inspector in immediate charge of the eradication of this disease. This report will be read with considerable interest by all who are interested in the future of the citrus industry in Mississippi. All who are really acquainted with the situation realize that citrus canker has been practically eliminated from the state. On paper the situation does not appear as good as it did at the close of 1920 when not a single infected plant was found in the state, or at the close of 1921 when only one infected tree was found. As a matter of fact, those in charge of the work feel that the situation is better at the close of 1922 than at the close of any previous year since citrus canker was first found in Mississippi.

The number of properties found infected with citrus canker each year for the past seven years is as follows:

Year—	Total Number of Infected Properties	Number of New Properties
1916.....	108	0
1917.....	47	12
1918.....	14	1
1919.....	4	0
1920.....	0	0
1921.....	1	1
1922.....	8	8



Not since 1919 has any citrus canker been found on a property previously infected with the disease, although these properties have all been inspected each year. During 1922 every single citrus plant that could be found in the six leading citrus growing counties was inspected. On paper there appear to be eight new properties that were found to be infected. For all practical purposes, these might be considered as three infections, as the six properties in the negro section of Moss Point are all close together. None of these properties is close to any commercial citrus grove or any nursery. Every plant infected with the disease was of course burned, and the surrounding soil was carefully disinfected with formaldehyde.

At the present time there is every reason to believe that there is not a tree in Mississippi infected with citrus canker.

### CLOSE SPACING FOR BOLL WEEVIL

That close spacing has uniformly given the largest yields of cotton, especially in the presence of the boll weevil, has been stressed for the past few years in Mississippi as a result of experiments conducted at the Holly Springs and the Delta Branch Experiment Stations. The value of this practice was again strongly emphasized at the annual conference of experiment station workers at the A. & M. College, on January 10-11, when the directors of the branch stations presented results of tests in 1922 showing that the highest yields were secured on narrow rows with a thick stand in the drill, and in the presence of an almost unprecedented weevil infestation.

Recommendations were made that on rich land rows should be 3 feet wide, hills 6 inches apart with 2 stalks to the hill. On thin land rows 2½ feet wide and perhaps three or four stalks to the hill, was advised. On the narrow rows, it was found that considerable time was saved in cultivating, as one furrow often did the work which required two furrows on the wider rows.

In the presence of the weevil, close spacing has a decided advantage over thin spacing, in that a greater number of bolls per row or per acre reach early maturity. The number of bolls on each stalk may be less, but the greater number of stalks more than equalizes this difference. Experiments indicate that close spacing also hastens the fruiting and maturity—another decided advantage.

### SAFEGUARDING THE CITRUS INDUSTRY

The illustration on the opposite page shows Inspectors Barnhart, Bynum, Harmon, and Porter inspecting 7,200 Satsuma orange trees at Gulfport, Mississippi, late in December, 1922, from a nursery in an-

other Gulf State. The other people shown in this picture are defoliating the plants. All of the leaves were burned.

There was a shortage in citrus nursery stock during the fall of 1922, and every nurseryman in the state had probably sold every plant that he had to sell. The nursery that made this large shipment had to comply with all of our regulations in regard to outstate nurseries, and also in order to get a special citrus permit had to be located at least one mile from where citrus canker had *ever* been found, had to be at least fifteen miles from any property where citrus canker has been known to occur any time during the past three years, and also this nursery must have been carefully inspected at least three times during 1922 by official nursery inspectors.

This nursery failed to comply with one of our regulations, that is, the plants were not defoliated before shipment into this state. As a consequence, the man who received these trees in Gulfport had to have each of them completely defoliated and the leaves burned under the supervision of Plant Board inspectors. Before this was done, however, each one of these plants was carefully inspected.

This is just one example of what the Plant Board is doing every day to protect the interests of the plant growers of Mississippi. This



Fig. 8. On Guard Against Citrus Canker. Inspecting and defoliating Satsuma orange trees shipped into Mississippi.

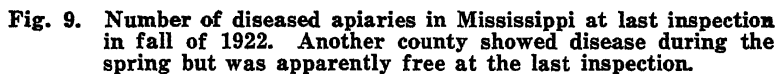
protection is given not only to the growers of fruit and ornamental trees, but to the growers of cotton, corn, sweet potatoes, sugar cane, alfalfa, pecans, garden and truck crops, and every other plant.

### APIARY INSPECTION REPORT

A summary of apiary inspections for 1922 shows that 772 apiaries containing 7,239 colonies were inspected at least once by the State Plant Board during the past season. Of this number, 106 apiaries containing 2,405 colonies, were given a second inspection, while 24 apiaries and 709 colonies were examined three times, making a total of 10,353 colonies inspected during the year.

Inspections were made in 26 counties but due to insufficient force and lack of time, some of the counties where no disease was found were not scouted thoroughly. Inspections were made in the following counties: Amite, Benton, Bolivar, Chickasaw, Copiah, Claiborne, Coahoma, DeSoto, Hinds, Issaquena, Leflore, Lafayette, Lincoln, Marshall, Panola, Pike, Quitman, Sharkey, Sunflower, Tallahatchie, Tate, Tunica, Warren, Walthall, Washington, and Yazoo.

The first inspection showed 236 colonies infected with American Foulbrood, which was reduced to 122 at the last inspection, a decrease of over 48%. European Foulbrood appeared in 489 colonies at the first inspection but was found in only 242 at the last inspection, a reduction of more than 50%. The situation is probably better than these figures indicate, as many beekeepers cleaned up their apiaries but the inspectors were unable to visit them again. The work was retarded a great deal by high water and an unusually poor season.



## SCOUTING REPORTS

Jan. 1—Dec. 31, 1922

<b>Cotton—For Pink Bollworm</b>		
Properties inspected .....		814
Acres of cotton inspected .....		44,687
Man-hours .....		2,036

<b>Corn—For European Corn Borer</b>		
Properties inspected .....		48
Acres of corn inspected .....		257
Man-hours .....		52

<b>Alfalfa—For Alfalfa Weevil</b>		
Properties inspected .....	27	
Acres of alfalfa inspected .....		778
Man-hours .....		34

<b>Beans and Peas—For Mexican Bean Beetle</b>		
Properties inspected .....		268
Acres inspected .....		1,093
Man-hours .....		257

<b>Sugar Cane—For Mosaic Disease and Moth Borers</b>		
Properties inspected .....		112
Properties infested with mosaic .....		23
Properties infested with moth borers .....		24
Total acreage inspected .....		148
Man-hours .....		141

<b>Sweet Potatoes—For Sweet Potato Weevil</b>		
Properties inspected .....		1,405

This does not include the work done by agents of the Federal Bureau of Entomology, who have made several hundred inspections also.

Home Orchards and Vineyards Inspected ..... 314

This does not include any commercial nurseries and the inspections made above were often in response to requests for control measures for orchard pests. In addition a large number of gardens and miscellaneous other crops were inspected during the year.

## SWEET POTATO FIELD INSPECTION REPORT

July 1—December 31, 1922.

Number properties inspected .....	1,032
Number acres sweet potatoes .....	2,850
Properties infected with Stem Rot .....	300

## CITRUS CANCER REPORT

October 1st to December 31st, 1922.

Number of Counties in the state which have at one time or another since 1916 shown canker -----	4
Number of Counties showing canker October 1-December 31----	2
Number of Grove trees inspected October 1-December 31-----	19,663
Number of Nursery trees inspected October 1-December 31-----	16,662
Number of C. trifoliata plants inspected October 1-December 31	88,105
Total number of Grove trees found infected June 1, 1916 to December 31, 1922 -----	3,117
Total number of Nursery trees found infected June 1, 1916 to December 31, 1922 -----	51,167
Number of properties infected during 1916 -----	108
Number of properties infected during 1917 -----	47
Number of properties infected during 1918 -----	14
Number of properties infected during 1919 -----	4
Number of properties infected during 1920 -----	0
Number of properties infected during 1921 -----	1
Number of properties infected during 1922 -----	8
Number of new properties infected during 1917 -----	12
Number of new properties infected during 1918 -----	1
Number of new properties infected during 1919 -----	0
Number of new properties infected during 1920 -----	0
Number of new properties infected during 1921 -----	1
Number of new properties infected during 1922 -----	8
Total number of properties found infected June 1, 1916 to December 31, 1922 -----	130
Total number of properties declared no longer danger centers--	122

## REPORT OF NURSERY INSPECTOR

For the Quarter Ending December 31, 1922

During this quarter 35 certificates were issued to agents or salesmen as required by Rule 34-B, adopted by the Plant Board.

Number of nurseries inspected .....	111
Acreage in nurseries inspected .....	547

**Amount of Nursery Stock Inspected:**

Grafted and budded pecans .....	77,100
Seedling pecans .....	135,950

Total Pecans .....	213,050
Citrus trifoliata .....	85,368
Orange .....	20,034
Grapefruit .....	110
Miscellaneous citrus .....	12

Total Citrus .....	105,524
Apples .....	7,925
Pear .....	31,860
Japanese persimmons .....	302
Peach .....	3,893
Grape .....	7,900
Fig .....	1,733
Strawberry .....	5,371,500
Miscellaneous fruit .....	1,102

Total fruit stock (citrus excluded) .....	5,426,215
Rose .....	307,865
Miscellaneous ornamentals .....	1,477,711

Total Ornamental Stock .....	1,785,576
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Grand Total of plants inspected during quarter .....	7,530,365
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## QUARANTINE INSPECTION REPORT

For Period from October 1 to December 31, 1922.

*(By Geo. F. Arnold, Quarantine Inspector)*

## Ship and Vessels Inspected:

From foreign ports -----	21
From U. S. ports -----	20
Total -----	41

## Parcels Inspected:

Arriving by water—None.

Arriving by land, express, freight, wagon, etc.:

Passed -----	1,429
Treated and passed -----	3
Returned to shipper -----	11
Contraband destroyed -----	24
Total -----	1,467

Arriving by mail:

Passed -----	419
Treated and passed -----	14
Returned to shipper -----	2
Contraband destroyed -----	9
Total -----	443

Grand total of parcels inspected ----- 1909

Number of parcels on hand December 31, 1922, pending de-  
termination as to final disposition -----

Total parcels passed -----	1848
Total parcels treated and passed -----	17
Total parcels returned to shipper -----	11
Contraband destroyed -----	33
Grand Total -----	1909



## INSECTS AND DISEASES INTERCEPTED DURING 1922 IN SHIP-

## MENTS BY ALL MEANS OF TRANSPORTATION

## EXCEPT BY MAIL

Insect or Disease—	Occurring On	From—	No. Shipments Infested or Infected
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato	Alabama	2
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato	Georgia	4
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato	Louisiana	1
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato	Mississippi	6
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato	Tennessee	5
Camellia Scale ( <i>Lepidosaphes camelliae</i> )	Japonica	Alabama	1
Camellia Scale ( <i>Lepidosaphes camelliae</i> )	Japonica	Louisiana	1
Chaff Scale ( <i>Parlatoria pergandii</i> )	Ornamental	Grand Cayman	1
Cherry Scale ( <i>Aspidiotus forbesi</i> )	Cherry	Indiana	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple	Alabama	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple	Mississippi	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple	Missouri	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple	Iowa	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple	Tennessee	5
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apricot	Alabama	2
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Fig	Mississippi	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Jesamine	Alabama	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach	Georgia	2
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach	N. Carolina	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach	Illinois	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach	Tennessee	6
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Plum	Tennessee	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Raspberry	Iowa	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Rose	N. Carolina	2
Dictyospermum Scale ( <i>Chrysomphalus dictyospermi</i> )	Palm	Louisiana	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Oleander	Louisiana	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Florida	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Louisiana	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Satsuma	Alabama	2
Long Scale ( <i>Lepidosaphes gloverii</i> )	Orange	Grand Cayman	1
Long Scale ( <i>Lepidosaphes gloverii</i> )	Satsuma	Louisiana	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Geranium	California	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Fig	Mississippi	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	Alabama	3

Insect or Disease—	Occurring On	From—	No. Shipments Infested or
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	Georgia	2
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	Mississippi	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	N. Carolina	2
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	Tennessee	5
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Plum	Georgia	1
Oleander Scale ( <i>Aspidiotus hederæ</i> )	Palm	Louisiana	1
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Apricot	N. Carolina	1
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	Alabama	6
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	Illinois	1
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	Missouri	1
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	N. Carolina	3
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	Tennessee	4
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Plum	Alabama	4
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Plum	N. Carolina	2
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Plum	Tennessee	2
Purple Scale ( <i>Lepidosaphes beckii</i> )	Lemon	Unknown	1
Purple Scale ( <i>Lepidosaphes beckii</i> )	Orange	Louisiana	2
Purple Scale ( <i>Lepidosaphes beckii</i> )	Orange	Porto Rico	1
Quince Rust ( <i>Gymnosporangium globosum</i> )	Cedar	Georgia	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Apple	Alabama	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Lemon	Unknown	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Peach	Alabama	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Peach	N. Carolina	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Pear	Tennessee	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Plum	Alabama	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Plum	Florida	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Rose	Arkansas	1
Scale ( <i>Aspidiotus</i> sp.)	Cedar	Georgia	1
Scale ( <i>Diaspine</i> group)	Pear	Tennessee	1
Scale ( <i>Lepidosaphes albus</i> )	Ornamental		
	Cane	Grand Cayman	1
Scale ( <i>Parlatoria proteus</i> )	Palm	Florida	1
Scale ( <i>Parlatoria zizyphus</i> )	Lemon	Unknown	1
Scale ( <i>Coccidae</i> )	Ornamental	Tennessee	1
Soft Brown Scale ( <i>Coccus hesperidum</i> )	Oleander	Louisiana	1
Storage Rot ( <i>Rhizopus nigricans</i> )	Sweet Potato	Ohio	1
Sweet Potato Weevil ( <i>Cylas formicarius</i> )	Sweet Potato	Louisiana	5
Walnut Scale ( <i>Aspidiotus juglans-regiæ</i> )	Rose	Arkansas	1
White Fly ( <i>Dialeurodes</i> )	Japonica	Louisiana	1
White Fly ( <i>Aleurodidae</i> )	Gardenia		
	fortunei	Georgia	1
White Fly ( <i>Aleurodidae</i> )	Orange	Louisiana	1
White Fly ( <i>Aleurodidae</i> )	Primrose	Nebraska	1

# INSECTS AND DISEASES INTERCEPTED DURING 1922 IN MAIL SHIPMENTS

Insect or Disease—	Occurring On From—	No. Shipments Infested or Infected
Ant ( <i>Pheidole megacephala</i> )	African Daisy Hawaii	1
Argentine Ant ( <i>Iridomyrmex humilis</i> )	Grape Mississippi	1
Beetle ( <i>Nyctobates</i> sp.)	Chrysanthemum Louisiana	1
Beetle ( <i>Coleoptera</i> )	African Daisy Hawaii	1
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Alabama	5
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Arkansas	2
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Georgia	6
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Kentucky	1
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Louisiana	1
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Mississippi	19
Black Rot ( <i>Sphaeronema fimbriatum</i> )	Sweet Potato Tennessee	13
Black Scale ( <i>Saissetia oleae</i> )	Oleander Florida	1
Brown Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern Georgia	1
Brown Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern Louisiana	2
Brown Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern Mississippi	1
Brown Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern New York	2
Brown Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern Pennsylvania	1
Camellia Scale ( <i>Lepidosaphes camelliae</i> )	Japonica Alabama	1
Camellia Scale ( <i>Lepidosaphes camelliae</i> )	Japonica Georgia	2
Camellia Scale ( <i>Lepidosaphes camelliae</i> )	Japonica Louisiana	2
Carnation Rust ( <i>Uromyces caryophyllinus</i> )	Carnation Ohio	1
Chaff Scale ( <i>Parlatoria pergandii</i> )	Japonica Georgia	1
Crown Borer ( <i>Tyloderma fragariae</i> )	Strawberry Arkansas	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple Arkansas	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple Illinois	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Apple Tennessee	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Berry Kansas	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach Alabama	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peach Arkansas	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Peony Mississippi	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Raspberry North Carolina	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Rose Mississippi	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Rose New Jersey	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Rose Tennessee	1
Crown Gall ( <i>Pseudomonas tumefaciens</i> )	Ornamental Arkansas	1

Insect or Disease—	Occurring On From—	No. Shipments	
		Infested or	Infected
Cyanophyllum Scale ( <i>Aspidiotus cyanophylli</i> )	Palm	Louisiana	1
Dictyospermum Scale ( <i>Chrysomphalus dictyospermi</i> )	Palm	Louisiana	2
Downy Mildew ( <i>Plasmopara viticola</i> )	Grape	Mississippi	1
European Florinia ( <i>Fiorinia theae</i> )	Japonica	Alabama	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Louisiana	5
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Sweet Olive	Louisiana	2
Foot Rot ( <i>Plenodomus destruens</i> )	Sweet Potato	Tennessee	1
Gall Midge ( <i>Diarthronomyia hypogaea</i> )	Chrysanthemum	Michigan	1
Gall Midge ( <i>Diarthronomyia hypogaea</i> )	Chrysanthemum	Pennsylvania	6
Grape Scale ( <i>Aspidiotus uvae</i> )	Grape	Kentucky	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Sweet Olive	Louisiana	1
Lataniae Scale ( <i>Aspidiotus lataniae</i> )	Evergreen shrub	Mississippi	1
Lataniae Scale ( <i>Aspidiotus lataniae</i> )	Lilac	Unknown	1
Lataniae Scale ( <i>Aspidiotus lataniae</i> )	Oleander	Florida	1
Lataniae Scale ( <i>Aspidiotus lataniae</i> )	Pecan	Mississippi	1
Leaf Miner	Rose	Arkansas	1
Leaf Spot	Geranium	Louisiana	1
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Illinois	4
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Iowa	1
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Louisiana	6
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Michigan	1
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Ohio	46
Leaf Spot ( <i>Diplocarpon rosae</i> )	Rose	Pennsylvania	21
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Arkansas	1
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Illinois	1
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Iowa	1
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Maryland	2
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Mississippi	1
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	North Carolina	3
Leaf Spot ( <i>Mycosphaerella fragariae</i> )	Strawberry	Tennessee	5
Lepidopterous larva	Fern	Ohio	1
Lepidopterous larva	Flowers	New York	1
Lepidopterous larva	Geranium	Ohio	1
Lepidopterous larva	Chrysanthemum	Georgia	3
Lepidopterous larva	Ornamental	Ohio	1

Insect or Disease—	Occurring On From—	No. Shipments Infested or Infected	
Mealy Bug ( <i>Pseudococcus</i> sp.)	Abutilon	Ohio	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Coleus	Illinois	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Coleus	New York	2
Mealy Bug ( <i>Pseudococcus</i> sp.)	Jesamine	Iowa	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Oleander	Ohio	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Pelargonium	New York	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Poinsettia	New York	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Rose	Ohio	1
Mealy Bug ( <i>Pseudococcus</i> sp.)	Ornamental	Ohio	1
Mildew ( <i>Sphaerotheca pannosa</i> )	Rose	Ohio	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Cherry	Kentucky	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Fig	Mississippi	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Fig	Tennessee	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Fig	Illinois	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Jerusalem Cherry	Illinois	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Raspberry	Pennsylvania	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Peach	Illinois	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Rose	Ohio	1
Nematode Root Knot ( <i>Heterodera schachtii</i> )	Rose	Pennsylvania	2
Oleander Scale ( <i>Aspidiotus hederæ</i> )	Japonica	Ohio	1
Oleander Scale ( <i>Aspidiotus hederæ</i> )	Oleander	Mississippi	1
Oleander Scale ( <i>Aspidiotus hederæ</i> )	Oleander	New York	1
Oleander Scale ( <i>Aspidiotus hederæ</i> )	Oleander	Ohio	1
Peach Borer ( <i>Sanninoidea exitiosa</i> )	Peach	Alabama	1
Plant Louse ( <i>Aphididae</i> )	Cabbage	Georgia	1
Plant Louse ( <i>Aphididae</i> )	Chrysanthemum	Alabama	1
Plant Louse ( <i>Aphididae</i> )	Chrysanthemum	Mississippi	3
Plant Louse ( <i>Aphididae</i> )	Chrysanthemum	Ohio	3
Plant Louse ( <i>Aphididae</i> )	Chrysanthemum	Pennsylvania	1
Plant Louse ( <i>Aphididae</i> )	Chrysanthemum	Georgia	1
Plant Louse ( <i>Aphididae</i> )	Ornamental	Ohio	1
Plant Louse ( <i>Aphididae</i> )	Rose	Indiana	1
Plant Louse ( <i>Aphididae</i> )	Rose	Louisiana	1
Plant Louse ( <i>Aphididae</i> )	Rose	Mississippi	1
Plant Louse ( <i>Aphididae</i> )	Rose	Ohio	4
Plant Louse ( <i>Aphididae</i> )	Rose	Pennsylvania	33

Insect or Disease—	Occurring On	No. Shipments Infested or	
		From—	Infected
Purple Scale ( <i>Lepidosaphes beckii</i> )	Lilac	Unknown	1
Psyllid	Pelargonium	Ohio	1
Red Spider ( <i>Tetranychus telarius</i> )	Butterfly		
	Plant	Ohio	1
Red Spider ( <i>Tetranychus telarius</i> )	Cape Jesamine	Louisiana	1
Red Spider ( <i>Tetranychus telarius</i> )	Rose	Indiana	1
Red Spider ( <i>Tetranychus telarius</i> )	Rose	Ohio	13
Red Spider ( <i>Tetranychus telarius</i> )	Sage	New York	1
Red Spider ( <i>Tetranychus telarius</i> )	Ornamental	Arkansas	1
Round-headed wood borer ( <i>Cerambycidae</i> )	Shrub	Mississippi	1
Rose Scale ( <i>Aulacaspis rosae</i> )	Berry	Kansas	1
Rose Scale ( <i>Aulacaspis rosae</i> )	Raspberry	Tennessee	1
Rose Scale ( <i>Aulacaspis rosae</i> )	Rose	Mississippi	4
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Ornamental		
	Cuttings	Mississippi	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Peach	Alabama	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Pear	Louisiana	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Pear	Kansas	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Rose	Louisiana	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Rose	Mississippi	4
Scale ( <i>Coccidae</i> )	Apple	Michigan	2
Scale ( <i>Coccidae</i> )	Cape Jesamine	Louisiana	1
Scale ( <i>Coccidae</i> )	Fern	Ohio	1
Scale ( <i>Coccidae</i> )	Japonica	Louisiana	1
Scale ( <i>Coccidae</i> )	Japonica	Mississippi	1
Scale ( <i>Coccidae</i> )	Ornamental		
	Cuttings	Mississippi	1
Scale ( <i>Coccidae</i> )	Palm	Louisiana	6
Scale ( <i>Coccidae</i> )	Rose	Mississippi	1
Scale ( <i>Coccidae</i> )	Sweet Olive	Louisiana	1
Soft Brown Scale ( <i>Coccus hesperidum</i> )	Palm	Louisiana	1
Stem Rot ( <i>Fusarium</i> sp.)	Sweet Potato	Mississippi	1
Termite ( <i>Termitidae</i> )	Hollyhock	Illinois	1
White Fly ( <i>Dialeurodes</i> sp.)	Cape Jesamine	Alabama	1
White Fly ( <i>Dialeurodes</i> sp.)	Cape Jesamine	Louisiana	2
White Fly ( <i>Dialeurodes</i> sp.)	Cape Jesamine	Mississippi	2
White Fly ( <i>Aleurodidae</i> )	Evergreen		
	Shrub	Mississippi	1
White Fly ( <i>Aleurodidae</i> )	Fuchsia	Illinois	1
White Fly ( <i>Aleurodidae</i> )	Ornamental	Georgia	2
Woolly Aphis ( <i>Erisoma lanigera</i> )	Apple	Illinois	1



# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 3

APRIL, 1923

No. 1

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.



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# Controlling the Curculio, Brown Rot, and Scab of Peaches in Mississippi\*

Oliver I. Snapp, Entomologist, U. S. Department of Agriculture

The yearly loss to peach growers of this country from the curculio will often exceed eight million dollars. In one of the Southern states a few years ago this dangerous peach pest caused a loss of over two million dollars. As a rule curculio injury is more severe in concentrated peach sections which have been established for years. Usually losses from the curculio are not great in new peach sections until careless and ineffective control measures bring about an accumulation of the progeny of the insect. Mississippi has at present several sizable commercial peach sections that are destined to become valuable assets to the state, provided they are properly handled. These orchards were started several years ago in localities where very few peaches had been grown commercially before. Consequently, the pests that attack the fruit have not yet become established in numbers in these sections, and no considerable amount of injury has resulted from insect and disease attacks. The purpose of this paper is to give to the peach growers of the state the latest information on the control of the pests that attack the peach fruit, and to broadcast a word of warning to Mississippi's new peach growers to annually enforce control measures in their orchards with thoroughness and care in order to prevent the establishment and accumulation of pests which may break out in uncontrollable numbers in years to come, and thereby cause a partial collapse of the peach industry in the state when it is still in its infancy.

## Character of Curculio Injury and Its Relation to Brown Rot

The curculio injures the peach by puncturing it for feeding or egg-laying. The feeding puncture very often scars the fruit, while the larva that hatches from the egg deposited in an egg puncture lives within the fruit until it is practically full grown and thereby renders the fruit unmerchantable.

The curculio not only damages the peach directly, but the rupture of the skin for feeding or oviposition furnishes a place for brown-rot to enter; in fact, a very large percentage of the brown rot infections are caused in this way. There is an interrelation between curculio attack and brown rot infection, and a heavy curculio infestation, therefore facilitates the establishment of brown rot infections.

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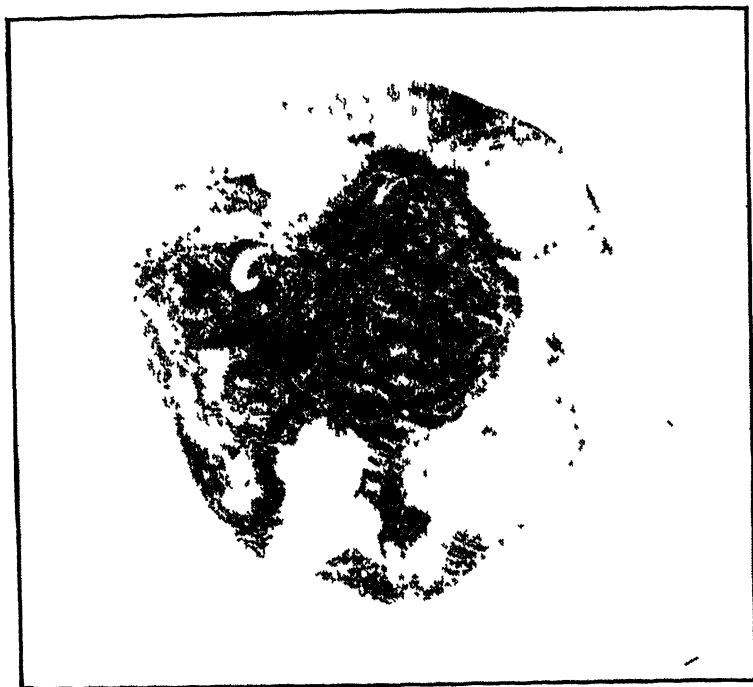


Fig. 1—Curculio "worm" in peach.

### Pick Up and Destroy Peach "Drops"

Recent life-history studies have proven as a scientific fact that two generations of the curculio occur annually in the Gulf States. These studies also revealed the fact that the majority of the "worms" in the peaches of the best late varieties in these states are "worms" of the second generation. In order to successfully control the insect in this latitude control measures should be concentrated especially on the first generation, because by so doing the size of the destructive second brood of "worms" will be correspondingly reduced.

A majority of the peaches punctured while small fall to the ground within a few weeks after the calyces, or "shucks", have been pushed off. This is a result of the fruit being weakened by the work of the curculio, causing it to fall with other weakened fruit in Nature's system of thinning during the April drop. Peach drop experiments show that an average of over fifty per cent of the peaches that drop before May 5 are infested with curculio larvae. Consequently, the frequent destruction of the early drops prevents the development of countless



Fig. 2—Brown rot on Peaches.

numbers of the adults of the first generation, and this has a direct bearing on the reduction of the destructive second brood of "worms".

The very small peaches that fall first are the ones that contain most of the larvæ, and the percentage of infested drops decreases as the larger fruits fall. Under normal conditions it would not be economical for Southern peach growers to make more than three collections of drops, making the first soon after the shucks shed, and the other two at intervals of five or six days. Results of some recent experimental work along this line, where the drops were collected from a large orchard regularly every few days, showed that the first collection of drops, which was made shortly after the "shucks" had been pushed off, contained over one-half of the larvæ collected in dropped peaches in this orchard during the entire season, and the first three collections gave over 88 per cent. These figures substantiate the results of former experiments in that the bulk of the infestation in drops will be found in the smallest peaches that fall first.



Fig. 3—Small, hard "drops" like these usually contain curculio "worms". Get the smallest ones.

The cost of this operation is surprisingly low. Actual figures obtained on the cost of picking up drops in both commercial and experimental orchards average two and one-tenth cents per tree for the three collections. In one orchard five collections were made at a cost

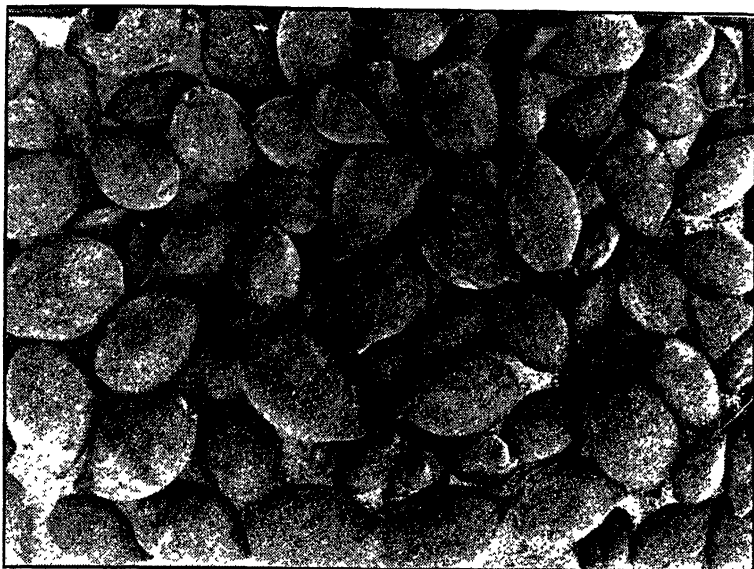


Fig. 4—"Drops" like these are not so likely to be infested with curculio "worms".

of two and nine-tenths cents per tree. It has been found that the best way to dispose of peach drops is to bury them in a trench, covering them with a layer of quicklime and at least twelve inches of soil. Boiling is perhaps a good method of killing larvæ in "drops". Some have tried to burn "drops", but this is not very satisfactory on account of the water content of the fruit. Others have disposed of "drops" by throwing them into a river or pond. I doubt the expediency of this method of disposition, as the curculio larva and pupa are able to keep alive on top of water for a considerable length of time.

#### Disking As a Control Measure

After the larva or "worm" of the curculio reaches maturity in the peach, it eats its way out and enters the soil to pass the pupa stage, which is the period of transformation in the insect's life history from the larva to the adult or beetle. The "worm", however, does not pass into the pupa stage immediately after entering the soil, but remains in the larva stage for a few days until it can prepare a soil cell to protect it during the transformation. Upon the completion of this cell, which is merely a small cavity in the soil smoothed by the larva,

the "worm" changes to the pupa, the helpless, inactive stage in the insect's development. Frequent disking during this period with an extension disk (Fig. 5), so that the soil can be stirred close to the tree trunks, destroys or breaks up many of the pupal cells, and since the insect is in a helpless state, another cell can not be prepared. The pressure and heat of the soil then cause the death of many pupæ, in addition to those killed directly by the disk or by exposure to the elements and predacious enemies.



Fig. 5—Using the extension disk for destruction of curcul'o pupæ.

The time spent in the soil by the curculio during this period of transformation averages about one month, and the pupal cells are all made in the first three inches of surface soil. Disking for pupæ destruction should be started in Mississippi about May 15, and repeated frequently, at intervals of one week if practicable, until the late varieties have been harvested, provided the orchard is not sown down to peas or other crops in June or July. An effort should be made to disk as close to the tree trunks as possible without scarring them, as most of the pupal cells occur under the spread of the trees. Since pupæ in the soil during May and June develop into beetles that are responsible for most of the "worms" in late varieties at harvest time, this is a highly desirable control measure.

### Orchard Sanitation for Curculio and Brown Rot Control

The curculio lives over winter in the adult stage, hibernating in grown up fence or terrace rows in or near the orchard or in nearby woodlands waste fields, pruning piles or rubbish. The burning over of any woodlands or waste land adjacent to peach orchards, therefore, undoubtedly destroys many of the adult beetles. Most of the hibernation in woodlands takes place within the first three hundred yards of a peach orchard. During the winter peach growers are advised to go into wooded areas to that distance and brush back the leaves, sticks etc with a pronged stick and light the windroll allowing the fire to burn toward the orchard. In this manner forest destruction is prevented by holding the fire in check. There are very few days during the winter months when this work can be properly done as a sweeping, vigorous fire is necessary to burn the vegetation and rubbish close to the ground. For this work, therefore orchardists should take advantage of the first dry period after the first killing frost in the fall.

Not only should the first 300 yards of woodlands and waste lands adjoining peach orchards be burned over during the winter and the



Fig 6—Burning over the first 300 yards of woodlands adjoining a peach orchard to destroy hibernating curculios



pruning, brush and rubbish heaps be destroyed, but the vegetation that has grown up along fence rows should also be grubbed out and destroyed. Terrace rows in and near orchards should receive attention during winter months, as both fence and terrace rows grown up to vegetation furnish excellent hibernating quarters for the curculio.



Fig 7—Cleaning up fence rows to destroy curculio hibernating quarters

### Spraying and Dusting

The foregoing supplementary control measures will aid materially in checking curculio and brown rot of peaches, especially if these pests are giving considerable trouble, however, they cannot take the place of spraying or dusting, and each year peach growers in Mississippi must carry through a definite schedule of spraying or dusting, in addition to the supplementary control measures, if curculio, brown rot and scab are to be successfully controlled.

Recent observations on the habits of the curculio gave us an important clue to work on in perfecting an efficient spray schedule. Our records show that the adult curculios start leaving their hibernating quarters when the buds start to burst in the spring, and by the time the trees are in full bloom the beetles are out in numbers. Before egg deposition the beetles always do considerable feeding. When the

beetles first make their appearance from hibernation the small peaches are enveloped in the calyces, and the beetles are forced to feed on the flower or foliage. The calyces of the peach flower at that season of the year are green and succulent, and apparently palatable to the insects. They feed greedily upon them before the small peaches are exposed. After these facts were revealed we found that an early application of arsenate of lead when about 75% of the petals had fallen, killed off many of the adult beetles while the peach is still enveloped by the calyx, and before the insects have had an opportunity to deposit any eggs in the fruit.

This early application has a great influence on the infestation in peach "drops", and if the infestation in the "drops" is light the destructive second brood of "worms" that appear in the harvested fruit will be correspondingly light. There were 15% more wormy "drops" from the experimental block of trees that did not receive this early arsenate of lead treatment last year than there were from the block that was sprayed when 75% of the petals had fallen.

In latitudes where there are two generations of the curculio an application of arsenate of lead four weeks before each variety is ready to pull is of great importance for the control of the second brood of "worms". 17% of the fruit harvested last season from a large plat of trees was "wormy" where the arsenate of lead treatment four weeks before harvest was omitted; whereas the infestation on a large plat where the final lead arsenate treatment was made four weeks before harvest was only 1.8%.

Egg deposition by the curculio takes place during two distinct periods in the development of the peach; namely, between the shedding of the calyces or "shucks" and the beginning of the stone hardening period, and during the peach ripening and swelling period. There are practically no eggs deposited while the stone of the peach is hardening, which usually starts about four weeks after the "shucks" fall and lasts until about four weeks before the fruit is ready to be harvested. Since there is very little if any curculio egg deposition while the stone of the peach is hardening sprays applied for the control of the curculio during that period are worthless.

As a result of studies and experiments conducted in Mississippi and Georgia during the past five years, the following spraying and dusting schedules for peaches are recommended:

#### **Spraying Schedule for Mississippi Peaches**

**First Application.**—When 75% of the petals (pink part of flower) have fallen, use one pound of powdered arsenate of lead, plus lime water from three pounds of unslaked lime, to each 50 gallons of water.

**Second Application.**—When the calyces, or "shucks", are shedding,

which is usually about ten days after the falling of the petals, use the same spray as recommended for the first application.

**Third Application.**—Two weeks after the second application, or about four weeks after the petals fall, use self-boiled lime-sulphur 8-8-50 alone.

**Fourth Application.**—Four weeks before each variety is due to ripen, use one pound of powdered arsenate of lead to each 50 gallons of 8-8-50 self-boiled lime-sulphur.

If the curculio infestation is heavy it would be advisable to use arsenate of lead also in the third application of the above schedule; however, four liquid applications of arsenate of lead per season are too many for peach trees in the South as an annual treatment. Some foliage burning will usually result when four liquid applications of arsenate of lead are used.

#### **Dusting Schedule for Mississippi Peaches**

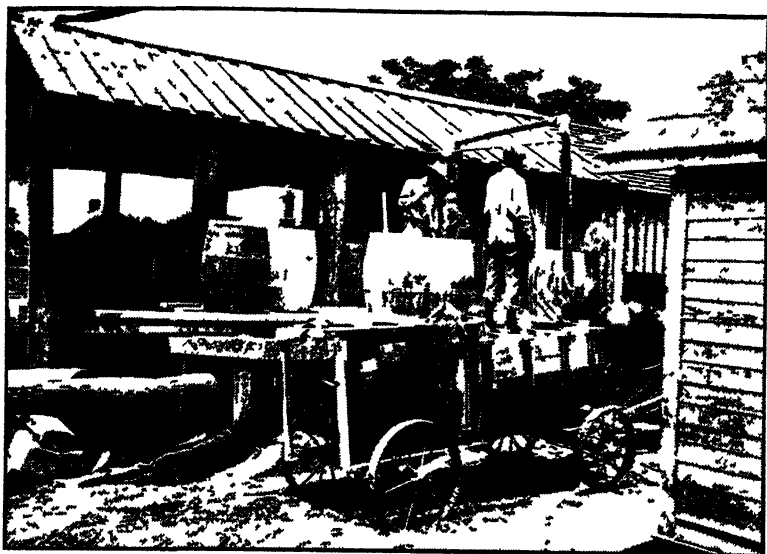
If the grower desires to use dust instead of liquid, the 5% arsenate of lead and 95% hydrated lime formula is recommended for the first two applications, and the 80% sulphur, 5% arsenate of lead, and 15% hydrated lime formula for the last two applications. Make each application of dust at the time recommended for the liquid applications in the spraying schedule.

#### **Directions for Preparing Spray Materials**

The 8-8-50 self-boiled lime-sulphur called for in the spraying schedule is made as follows:

Place eight pounds of good unslaked lime in a barrel or tub, and pour over it enough water, preferably warm, to start the slaking. As the slaking begins, add eight pounds of sulphur. Add water from time to time as needed to keep the mixture from becoming dry, but be careful not to drown the lime, as this will cause the boiling process to stop too soon. After the mixture has boiled about five minutes, or when the lime has about finished slaking, cool with water, strain into the spray tank, and dilute with water to 50 gallons. Care should be taken to cool the mixture by the addition of water just as soon as the red or coffee colored streaks appear on the surface of the mixture. Better results will be obtained by crushing all lumps of sulphur and mixing it with a little water before adding to the slaking lime.

The formula may be raised to 16-16-100 or 32-32-200. A large container should be used, however, in preparing self-boiled lime-sulphur with these formulas.



**Fig. 8—Preparation of self-boiled lime-sulphur is an easy and simple operation with the proper equipment.**

The powdered arsenate of lead which is used in the proportion of one pound to each 50 gallons of the spray solution should first be made into a thin paste with water before adding to the spray tank

Materials for dusting should be very fine and thoroughly mixed. A very light diplumbic arsenate of lead, superfine sulphur flour guaranteed 95% to pass a 200-mesh sieve to the square inch, and hydrated lime should be used for all dust mixtures.

#### **Success with Spraying or Dusting Depends on Thoroughness**

To attain successful pest control with either spray or dust, the applications must be made at the right time with thoroughness. The failure of many peach growers to secure the proper control of insects and diseases very often is directly due to careless spraying by inexperienced or unsupervised laborers, whose object is to get over the greatest number of trees in a given time, with no attention to how well the job is done. When spraying, work on each tree should be completed by the spray man before he goes to the next. It is best to start on the side of the tree opposite the spray outfit and work around it until the entire tree is covered. An effort should be made to cover all sides of each peach. This system takes the spray outfit down every other middle. Very often a portion of the tree is completely

missed by the spray when only one-half of the trees are sprayed from one middle and finished when the outfit comes up the next middle.

It is quite essential, when using dust, to proceed down each tree row, dusting the near side of every tree. It is practically impossible to obtain satisfactory results if dusting is done only in every second or third tree row. It is best to make each dust application from a different side of the tree, but usually the prevailing wind makes this impossible. Avoid wasting the material. If the wind is blowing in the same direction that the duster is moving, open the discharge pipe before reaching the tree and close it before the tree is passed. If the wind is blowing in the opposite direction from the way the duster is moving, then a better job of dusting can be accomplished by waiting until the outfit is opposite the tree before opening the discharge pipe. Always move the discharge pipe in one direction, either horizontally or vertically, until the tree is enveloped in the dust.

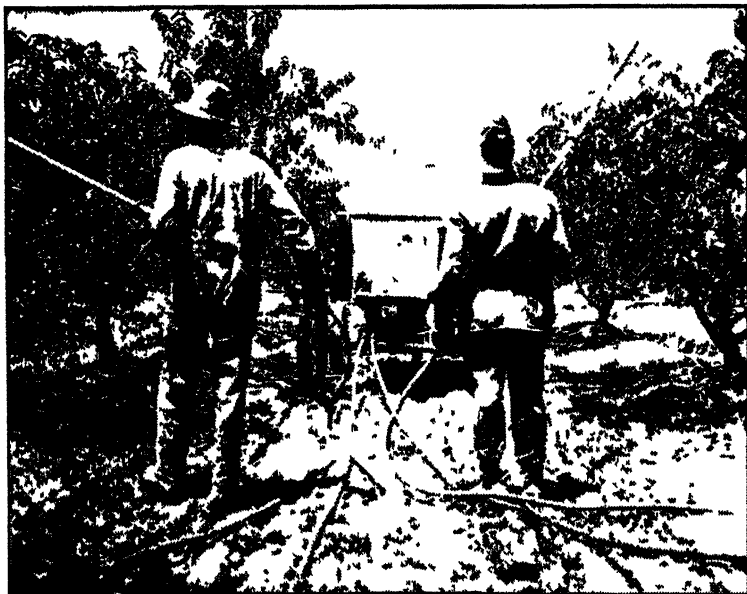


Fig. 9—Effective spraying for peach pest control is dependent on thoroughness.

*The curculio, brown rot, and scab must be controlled at very definite times, and spraying or dusting at other times will not bring the*



Fig 10—Dust every tree from one side, enveloping it in the dust

*desired results* Thorough spraying or dusting provided the applications are made at a time when they will be most effective, are the potent factors in the successful control of the curculio and brown rot. Therefore the growers of peaches in Mississippi should see that the spray or dust applications are made to future peach crops at exactly the right time with special attention to thoroughness. If the water supply is far distant from the orchard or if there are not sufficient spray outfits to handle the acreage in a few days, much time can be saved by hauling the water to the spray outfits in the orchard. If this is done the spray tank can be refilled at any place in the orchard when the spray gives out. Where the spraying job is left almost entirely to negro laborers, as is the case in many orchards in the state, proper supervision should be maintained at all times to see that the operation is properly and thoroughly performed.

## EARLY BLIGHT OF TOMATOES

By D. C. Neal, Plant Pathologist

Complaints are being received from trucking centers in Mississippi regarding a disease of tomatoes now prevalent in many cold frames

ard in the field This disease is "Early Blight" and is commonly known among growers as Rust It is also sometimes referred to as brown rust blight and leaf spot When affecting the fruit it is called nailhead rust birdseye or black rot

This disease may attack the plants at almost any stage in their development It first becomes noticeable usually on the lower leaves

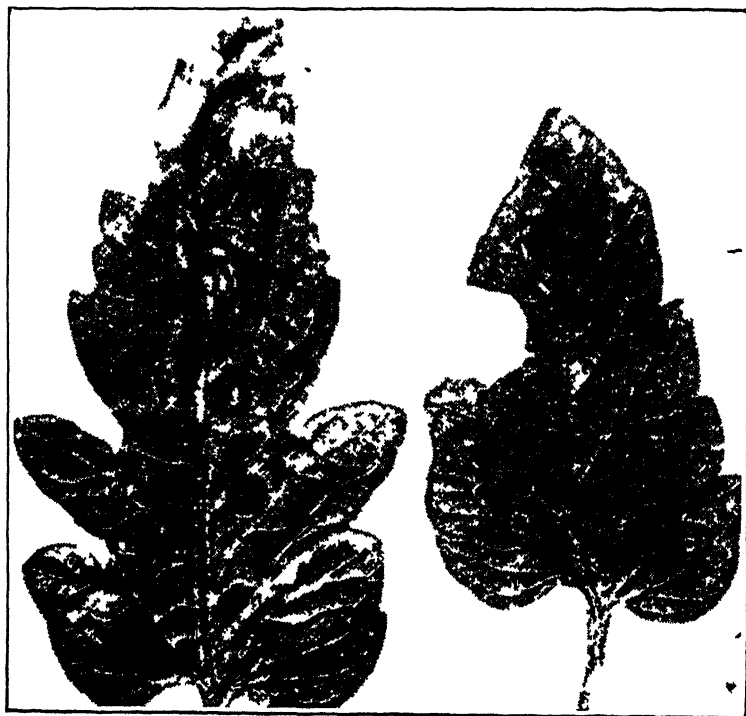


Fig 11.—Tomato leaves spotted with early blight  
(Sherbakoff, C D, Fla Exp Sta Bul 146)

of the plants in the form of small brown or black spots These spots may be scattered and inconspicuous at first, but later, if conditions are favorable, increase in size and number As the disease progresses, the leaves are gradually killed, the lower ones first, and later the upper ones A badly infected plant shows the leaves to be dead and the remaining green leaves at the top to be badly spotted The symp-

toms of tomato early blight on the leaves are similar in many respects to the early blight of Irish potatoes, and, in fact, the cause of this trouble on both tomato and Irish potato is the same fungus, namely, *Alternaria solani*. The black smutty covering usually accompanying the spots on the plants is nothing but a mass of spores of the fungus. Tomato leaves spotted with early blight are illustrated in Figure 11.

This disease is of special importance because, in addition to injuring the foliage of the plant and thereby retarding growth, it also

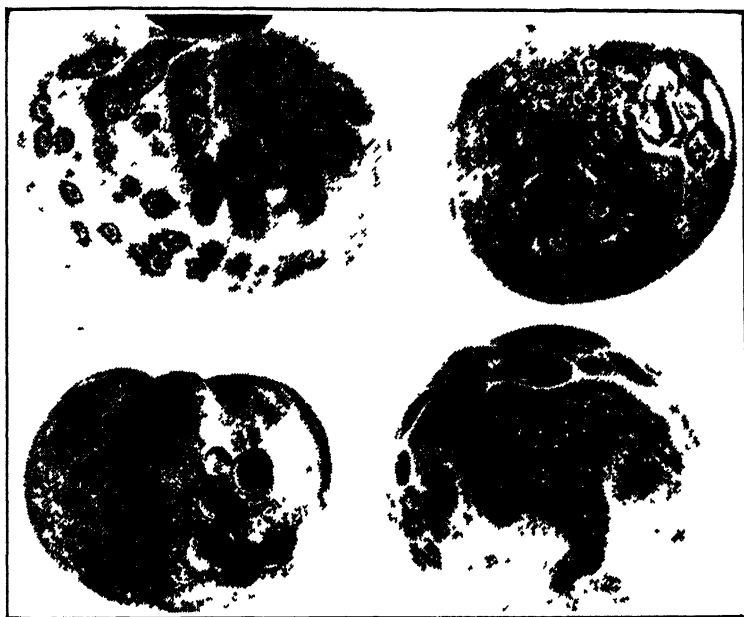


Fig. 12.—Tomato fruit spotted with early blight.  
(Sherbakoff, C. D., Fla. Exp. Sta. Bul. 146)

spots and rots the fruit. (Figure 12.) Under favorable weather conditions it is a common occurrence for early blight to destroy from 50% to 75% of a tomato crop.

The development of the disease is simple. Spores of the fungus are easily carried by the wind, and when there is enough moisture, they will germinate and invade the plant tissues after they have lodged thereon. After a while spots will result on which new crops of spores are produced, and again these spores will be scattered from plant to plant. If the weather is continuously wet and cloudy, the disease will soon destroy the entire crop of plants. Early blight is



not a new disease. It usually occurs wherever tomatoes are grown in varying degrees almost every season.

**Control of the Disease.**—Frequently plants become infected in the cold frames before they are set in the field, and this point should be looked after carefully when an attempt is made to control the disease. In controlling early blight, growers should use the same precautionary measures as with tomato wilt. All of the old diseased plants should be destroyed, the soil should be changed in the cold frames each season, and a rotation of crops consistently followed. Furthermore, the plants must be sprayed carefully and often with a 4-4-50 Bordeaux mixture solution. The spraying is to prevent the development of the disease, therefore, it pays to begin while the plants are still in the cold frame, and before the spots appear. Plants that are now showing signs of leaf spotting should be thoroughly sprayed with the 4-4-50 Bordeaux mixture. At least, three applications of the Bordeaux mixture should be given at intervals of ten days or two weeks, depending upon weather conditions. If the spraying is delayed until the plants are badly diseased, very little control can be accomplished. For staked tomatoes, it is probable that the knapsack type of spray pump will be the most satisfactory. The spray is put on as very fine mist, and for the best results, every exposed surface of the plant must be covered with the fungicide. Growers are now advised to spray both the upper and lower sides of the leaves and all parts of the tomato plants thoroughly, and to begin spraying operations immediately if early blight is noticeable on the plants. For further information address the State Plant Board, A. & M. College, Mississippi.

## COTTON DUSTING WITH CALCIUM ARSENATE IN MISSISSIPPI IN 1922

Prepared by the Delta Laboratory, Tallulah, La.

With the general increase in cotton dusting with calcium arsenate for boll weevil control, the State of Mississippi has kept pace with the other cotton growing states as shown by the increased amount of calcium arsenate and number of dusting machines sold during the season of 1922, as compared with previous years. In any reference to weevil poisoning it is worthy of note that the first large scale commercial poisoning with calcium arsenate was done in Mississippi in 1918 under the direction of members of the force of the Delta Laboratory, U. S. Department of Agriculture at Tallulah, La., in co-operation with large planters in the Delta.

The success of this early work is largely responsible for the gradual general adoption of poisoning by cotton growers throughout the South.

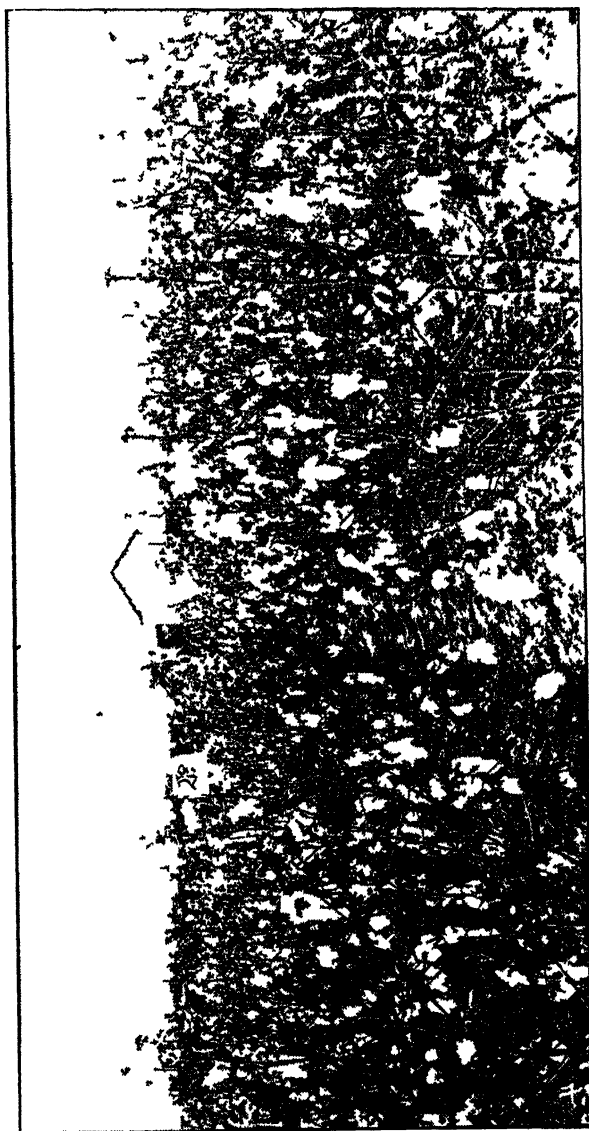


Fig. 13—Delta cotton field dusted with calcium arsenate.

So great has been the increase in the number of farmers who have adopted cotton dusting that it has been impossible for the Delta Laboratory to maintain contact with them all, or to keep them supplied

with current information, or to ascertain with what degree of success they were using calcium arsenate in control of the weevil.

With a view to ascertaining as far as possible to what extent the dusting of cotton was being accomplished successfully in the state, the Delta Laboratory mailed questionnaires to 577 growers who had indicated their intention of utilizing this method of weevil control.

Of this number 250 returned the questionnaire, 34 of which were eliminated for lack of sufficient information upon which to base any definite conclusion as to results secured.

Of the 216 farmers who made intelligible reports of their poisoning operations 143 reported satisfactory results; 59 reported the operation partially successful, while 14 reported failure.

Like other direct methods for control of boll weevil, dusting cotton with calcium arsenate has been undertaken by many growers solely from a sense of protection without regard to the actual need, since it does not always follow that the presence of boll weevils in cotton results in any serious injury to the crop or makes necessary or desirable the use of calcium arsenate.

The variable results secured by growers under varying conditions are in most instances accounted for by the differing numbers of weevils present or the intervention of weather conditions which promote or retard weevil multiplication during the growth of the crop; in other words, the increase in production of seed cotton from the successful use of calcium arsenate depends upon the numbers of weevils present and the damage they actually do to the crop as measured by comparable cotton acreage not poisoned. Failure to secure a profitable return from poisoning, while due in many cases to failure to follow the proper schedule in making applications, has been as often due to the use of poison where weevil damage was not great enough to warrant it.

If weevils are comparatively few and weather conditions are favorable for the rapid growth and early maturing of the crop the use of calcium arsenate will be less profitable than where weevils are abundant.

Success or failure in cotton dusting depends also upon the thoroughness with which the work is done and the method used in applying the poison. Even distribution of the poison with approved machinery is absolutely necessary for securing the best results.

Farmers who by reason of their location in sections infested by boll weevil contemplate the use of calcium arsenate as a measure of control should bear in mind that poisoning will be profitable only under the following conditions:

If the weevils are really numerous enough to injure the crop seri-

ously; and if the land is sufficiently fertile to yield at least a third of a bale per acre with weevil injury eliminated; and if the farming organization is such as to insure that the poison applications will be made at the right time and in the right manner; and if they are willing to spend the full amount necessary to provide an adequate supply of dusting machinery and poison.

Calcium arsenate should not be used if the cost of poison, the cost of the labor to apply it, and the depreciation on the dusting machines will total more per acre than the current value of 100 pounds of seed cotton.

Calcium arsenate cannot be successfully applied to cotton with makeshift devices. Only specialized machinery, which can be found on the market in most sections, should be used.

Before attempting to poison, detailed instructions should be obtained from the Entomologist, A. & M. College, Mississippi, or the Delta Laboratory, Tallulah, Louisiana.

## **WATERMELON ANTHRACNOSE: EFFECTIVE CONTROL MEASURES**

**By Henry D. Barker**

Anthracnose is one of the very serious diseases of watermelons in this state. In many cases, particularly during rainy harvest seasons, anthracnose often becomes the deciding factor between profit and loss. Frequently, even when conditions are not conducive to such serious epidemics, the disease is important enough to cause much injury to the vines and a reduction in the size of the melon. If diseased fruit is shipped other organisms of decay gain entrance through anthracnose spots and such melons are often completely rotted upon arrival at market.

### **How to Recognize the Disease**

Anthracnose, which is caused by a fungus known as *Colletotrichum lagenarium*, attacks both the vines and the melons. On the leaves it first appears in the form of black spots as is shown in Figure 14. After a prolonged period of wet weather it is often possible to see an orange pink layer partially covering the black spots. This is due to countless spores, fungus seed bodies, which spread the disease. With the increase of the disease the foliage shrivels and curls so that the field may look as if it has been burned over. On the fruit, early infection may result in deformation accompanied by the formation of irregular black sunken spots, or light green pimples with a yellow cast in the center. Pink spore masses often form on these. When infec-

tion occurs on older melons they are usually marked by small pimples or larger flattened elevations on the rind—sometimes spoken of as “pock marks”.

### How the Disease Is Spread

Any seed which is harvested from diseased melons is likely to be contaminated with anthracnose spores with the result that the young plant is almost certain to be infected. The disease is very often carried over winter in the soil where diseased plants and fruits are allowed to remain in the fields. After the disease appears in the field it is further spread by the wind and rain or carried in drainage water or by workers in the field during tillage operations. It is very important that work should never be done in a field when the plants are wet with rain or dew.

### Methods of Control

The most practicable method of reducing the damage done by anthracnose is to spray the watermelon vines with 4-4-50 Bordeaux mixture. If anthracnose spores are carried to healthy vines, they will become diseased unless protected by a coating of spray mixture which prevents the germination of these spores and the development of the fungus. Thorough applications of 4-4-50 Bordeaux mixture will prevent the spread of anthracnose and will help to control other diseases of the crop. It is important to realize that spraying is effective only to the extent that the entire surface of the healthy plant is kept covered with a thin coating of the spray solution, and that the disease spreads rapidly during and immediately after rainy weather. Consequently the grower must choose the proper time for the application. The following schedule will serve as a guide for making this selection:

Make the first application when the vines begin to run.

Spray the second time about one week after the first melons have “set” on the vines.

Make a third application about two weeks after the second.

If the rains are frequent just preceeding and during the loading season, it is sometimes profitable to continue spraying until the crop is harvested.

The grower must judge the number of applications necessary. In a dry season two or three may be sufficient, while in a wet season it has been found necessary and profitable to spray as many as six times. If power sprayers are to be used roadways should be left every third or fifth row, depending upon the number and length of the leads of hose used.

Liquid Bordeaux spray is made by dissolving four pounds of copper sulphate suspended over night in a sack half-submerged in a barrel of twenty-five gallons of water. In another wooden tub or bucket slake four pounds of fresh unslaked lime, being careful not to add too much or too little water, until it is steaming well and later add enough water to make twenty-five gallons. Mix these two solutions together and spray on the vines with at least seventy-five pounds pressure.

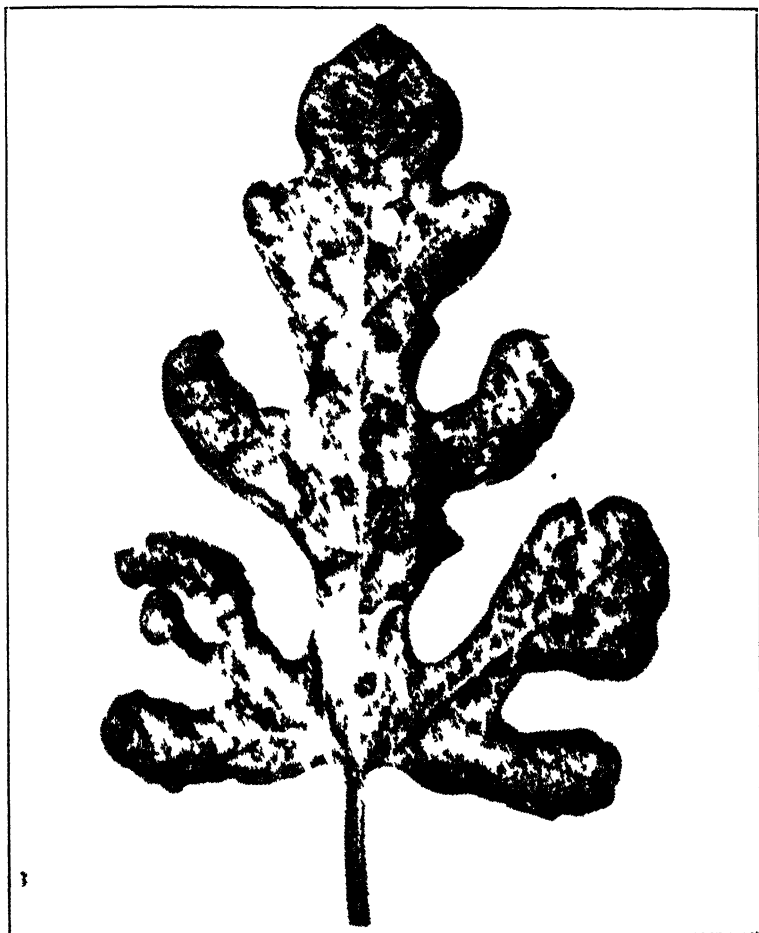


Fig. 14.—Watermelon leaf showing characteristic spots (lesions) caused by anthracnose.—Courtesy U. S. Department of Agriculture.

Other control measures than spraying that may be of help in keeping down the loss from the disease are (1) seed treatment with 1 to 1,000 bichloride of mercury (corrosive sublimate) for five minutes; (2) crop rotation.

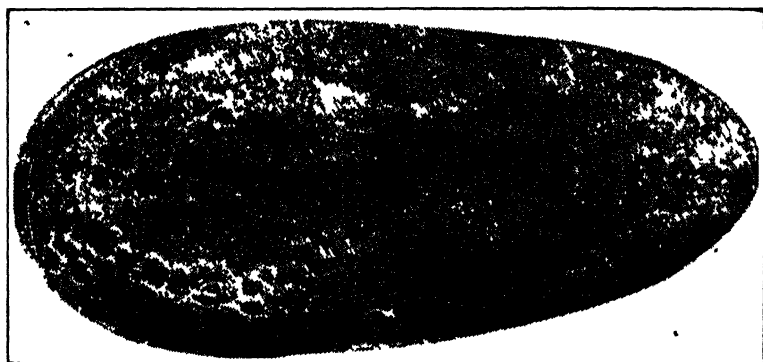


Fig. 15.—Watermelon anthracnose on the fruit.—Courtesy H. A. Cardinell and E. M. Page.

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### CONTROLLING THE AUSTRALIAN TOMATO WEEVIL, *Desiantha nociva*

By E. K. Bynum

This is a comparatively new insect in the United States. It was reported as doing considerable damage to Irish potatoes at McHenry, Miss., during the latter part of March, 1922, and has seriously injured turnips and Irish potatoes in several localities this year. Regarding control measures, the information gathered up to this time is rather limited, but it is thought best to give the growers the benefit of it.

This insect has biting mouth parts and is therefore most easily fought with a stomach poison such as Paris Green, lead arsenate, or calcium arsenate. Plants are more easily burned with Paris Green than with the other two poisons, hence they are preferred wherever effective control can be secured with them. Lead arsenate and calcium arsenate are best purchased in the powdered form, and while no dusting experiments have been carried on against this pest, it seems probable that dusting will be almost as effective as spraying.

An experiment in poisoning the larval stage of the weevil was recently conducted on the farm of Mr. Henry Krohn, eight miles north of Biloxi. The weevils were badly damaging turnips on this place. One plat of turnips was sprayed with lead arsenate at the rate of 1

pound to 50 gallons water, and another plat at the rate of 2 pounds to 50 gallons water. A small cage was placed over an average plant in each of the sprayed plats, and a similar cage over an average unsprayed plant as a check on the poisoned plants. Larvæ were collected from this field before it was sprayed and placed in each of the cages. Due to the fact that some of the larvæ bored into the soil and were lost, it is impossible to give the exact percentage of mortality, but at the end of 48 hours approximately 90% were dead, and an examination of the sprayed plats outside the cages showed a high mortality.

According to a report from Mr. W. D. Ashley of McHenry, he found lead arsenate very effective against the adult weevils, two applications bringing the pest under control when they were severely damaging his Irish potatoes. The writer has also conducted some experiments under insectary conditions in order to determine the effect of lead arsenate on the adult weevils. The weevils used in the experiments were collected from a field of turnips on April 5, 1923, and were confined for 24 hours without food before the experiments started. Half-gallon fruit jars with cheesecloth tops were used as containers. Medium-sized turnip leaves were used as food in each of the tests. The following table shows the mortality rate:

Mortality Table with Different Strengths of Lead Arsenate

Date—	1 pound lead arsenate. 48 gallons water. Leaves sprayed on only one side. 25 weevils in test.	1 pound lead arsenate. 48 gallons water. Leaves immersed. 50 weevils in test.	2 pounds lead arsenate. 48 gallons water. Leaves immersed. 25 weevils in test.	3 pounds lead arsenate. 48 gallons water. Leaves immersed. 25 weevils in test.	Check. Water only. Leaves immersed. 25 weevils in test.
April 6, '23.	Experi- ment started				
April 7.---	2	2	3	8	1
April 8.---	1	19	21	16	2
April 9.---	4	5	0	1	0
April 10.---	1	9	1	0	0
April 11.---	3	4	0	0	0
April 12.---	2	2	0	0	0
April 12.---	Experi- ment closed with 11 weevils (44%) alive.	Experi- ment closed. 9 weevils (18%) alive.	All weevils dead on April 10.	All weevils dead on April 9.	22 weevils (88%) alive.



From the above table it is easily seen that 2 pounds lead arsenate to approximately 50 gallons water is apparently an effective control. It also shows that it is necessary to cover the leaves thoroughly, for with the same strength spray the mortality was 50% greater where the leaves were completely covered.

Where crops are sprayed with arsenicals for the control of other insects, it is entirely possible that it will not be necessary to make additional applications to control the Australian Tomato Weevil, provided the strength recommended above is used.

# THE QUARTERLY BULLETIN

## STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

### CITRUS CANKER SCOUTING REPORT

For the Period January 1-March 31, 1923

Number of counties in the state which have at one time or another since 1916 shown canker.....	4
Number of counties showing canker January 1 to March 31, 1923.....	0
Number of grove trees inspected January 1 to March 31, 1923.....	32,095
Number of nursery trees inspected January 1 to March 31, 1923.....	9,224
Number of Citrus trifoliata plants inspected January 1 to March 31, 1923.....	89,854
Total number of grove trees found infected June 1, 1916 to March 31, 1923.....	3,117
Total number of nursery trees found infected June 1, 1916 to March 31, 1923.....	51,167
Number of properties infected during 1916.....	108
Number of properties infected during 1917.....	47
Number of properties infected during 1918.....	14
Number of properties infected during 1919.....	4
Number of properties infected during 1920.....	0
Number of properties infected during 1921.....	1
Number of properties infected during 1922.....	8
Number of properties infected during 1923.....	0
Number of new properties infected during 1917.....	12
Number of new properties infected during 1918.....	1

Number of new properties infected during 1919.....	0
Number of new properties infected during 1920.....	0
Number of new properties infected during 1921.....	1
Number of new properties infected during 1922.....	8
Number of new properties infected during 1923.....	0
Total number of properties found infected June 1, 1916 to March 31, 1923.....	130
Total number of properties declared no longer danger centers..	122

### REPORT OF NURSERY INSPECTOR FOR QUARTER ENDING MARCH 31, 1923

During this quarter twenty-one certificates were issued to agents or salesmen in Mississippi as required by Rule 34-B. Certificates of nursery inspection were filed in other states for seven Mississippi nurseries, and twenty-one Mississippi nurseries were inspected.

#### Certificate Tags Issued:

Permit certificate tags .....	2,600
Regular certificate tags .....	10,000
Dealers' certificate tags .....	1,679
Special citrus permit certificate tags .....	65
Total number tags issued.....	14,344

#### Amount of Nursery Stock Inspected:

Pecan .....	590
Pear .....	1,200
Peach .....	250
Grape .....	50
Strawberry .....	2,000

Total Fruit and Nut Stock..... 4,090

Deciduous flowering shrubs .....	251,662
Deciduous shade trees .....	1,528
Broad leaf evergreens .....	60,006
Coniferous evergreens .....	3,922
Miscellaneous ornamentals .....	171,527

Total ornamentals.....488,645

Grand total of plants inspected during quarter.....492,735

Circular letters were mailed to 7,800 purchasers of out-state grown nursery stock asking for information relative to the condition of stock

when received. As a result 108 complaints on stock received were reported, and 265 requests for control measures of insects and diseases, etc., were handled. Each complaint was taken up with the consignee and consignor and in most cases adjustments made were satisfactory.

Due to the fact that a number of Plant Board inspectors helped out in the sweet potato weevil eradication work during the quarter ending March 31st, only a limited number of nurseries were inspected. This accounts for the decrease in the total number of nursery plants inspected during the quarter.

## QUARANTINE INSPECTION REPORT

For Period from January 1 to March 31, 1923

By Geo. F. Arnold, Quarantine Inspector

## Ships and Vessels Inspected:

From foreign ports .....	29
From U. S. ports .....	26
Total.....	55

## Parcels Inspected:

Arriving by water—None.

Arriving by land, express, freight, wagon, etc.:

Passed .....	1407
Treated and passed .....	1
Returned to shipper .....	10
Contraband destroyed .....	13
Total.....	1431

Arriving by mail:

Passed .....	1390
Treated and passed .....	20
Returned to shipper .....	4
Contraband destroyed .....	26
Total.....	1440
Grand total of parcels inspected.....	2871

Number of parcels on hand March 31, 1923, pending determination as to final disposition.....

Total parcels passed .....	2797
Total parcels treated and passed .....	21
Total parcels returned to shipper .....	14
Total parcels contraband destroyed .....	39
Grand total.....	2871

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 3

JULY, 1923

No. 2

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STATE PLANT BOARD OF MISSISSIPPI  
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### **MEMBERS OF BOARD**

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# Controlling the Peach Borer with Paradichlorobenzene<sup>\*</sup>

Oliver I. Snapp, Entomologist,  
U. S. Department of Agriculture.

Probably no other insect pest, with the exception of the San Jose scale, causes as severe annual damage to peach trees in the state of Mississippi as does the peach borer. Each year many peach trees in the state are killed by this pest, and frequently the death of the tree is attributed to some irresponsible cause, especially by those who are not familiar with the work of the borer. The larva of borer injures the tree by feeding in the cambium or soft layers of the bark at or below the surface of the soil. The presence of borers is usually indicated by the exudation of a jelly-like substance at the base of the tree. Frass and small bits of bark and dirt are often mixed in with the gummy exudation. Most of the feeding and the consequent damage to the tree is done in the fall and spring, although the borers do some feeding during the warm days in the winter. They will often completely girdle a one or two-year-old peach tree in one season and thereby cause its death. Older trees are usually weakened by borer attacks to such an extent that they are highly susceptible to secondary pests which ultimately produce death or unproductivity.

For many years an effort has been made to find an effective and satisfactory means of control for the peach borer. Until recently these efforts have been in vain. Peach growers have had to resort to worming the trees with a knife. At its best this method is unsatisfactory. Borers are frequently missed by the laborer using the worming tools, especially if the "worms" are very small or if they have eaten into the inner portion of the tree trunk. Furthermore, greater damage is often done to the young trees by worming instruments in the hands of a careless worker than by the borers themselves.

Experiments with toxic gases for peach borer control were started by the Bureau of Entomology in 1915 and in October 1919 Mr. E. B. Blakeslee published the first paper on the use of paradichlorobenzene for the control of this destructive pest. For several years paradichlorobenzene experiments have been continued in the Georgia Peach Belt by the Bureau of Entomology in an effort to extend the use of the treatment to young peach trees, and to obtain data on the use of the chemical for borer control under Southern conditions.

<sup>\*</sup>Published by permission of the Secretary of Agriculture.



Paradichlorobenzene, when properly used, is one of our most highly effective insecticides. When the directions for its use are closely followed a 100 per cent control of the borers will result. In all of our work and experience with the chemical we have never observed a single case where the control was under 90 per cent when the material was properly used. On account of its effectiveness paradichlorobenzene for peach borer control has been rapidly increasing in popularity among peach growers in all sections of the country where the insect occurs. Large quantities of the chemical have been used during the last few years, and orchardists have satisfied themselves that it is a most practical and economic method of control. For several years the peach growers in Georgia have been using over a quarter of a million pounds of paradichlorobenzene annually.

### Paradichlorobenzene

Pure paradichlorobenzene is a white crystalline substance with a characteristic strong ethereal odor. It is insoluble in water and vaporizes slowly under favorable conditions. The gas is not poisonous to man or beast, but deadly to insects when they are subjected to its fumes for several weeks. The gas is much heavier than air, and expands and descends when it is placed about the tree. The action of the gas is local, and it is therefore necessary to make an even distribution of the crystals around the tree. Paradichlorobenzene should be of the fineness of granulated sugar for best results in controlling the peach borer. Some of the material offered on the market is a little too coarse for best rate of volatilization necessary to quickly kill the borers. Orchardists should also insist on strictly pure paradichlorobenzene. Some compounds sold for peach borer control have resulted in severe injury to the trees, while others have been found to be worthless as a control for the insect.

### Age of Trees

Results of recent paradichlorobenzene experiments have led us to the conclusion that the chemical can be used with safety in the South on peach trees three years of age and older. It should not be used on one and two-year-old trees. The bark of one and two-year-old trees is not sufficiently thick to protect the cambium layer of the tree from the toxic action of the gas.

### Size of Dose

For all trees three and four years of age use the three-fourths ounce dose. For all trees five years of age and older of average size use the full one ounce dose. One and one-quarter ounce doses should be used on very old trees if the trunks are unusually large.

### When to Apply

Peach growers in North Mississippi are advised to use the chemical between October 5 and 10. Those in Central Mississippi should

use it between October 10 and 15, and in South Mississippi the chemical should be used between October 15 and 20. The desired results cannot be expected unless the material is applied on or very close to the dates recommended, and growers are cautioned to give particular attention to the time of application.

Paradichlorobenzene applied in the spring about April 1 gives fairly good results in killing the borers, but at that season of the year the borers have already done considerable damage to the trees during the preceeding months. Injury to the tree by borers is nearly entirely eliminated by applying paradichlorobenzene at the end of the incubation period of the insect, which is during October in Mississippi.

### Preparing the Soil

All grass, weeds, stones, etc., should first be removed from around the tree trunk. Then the soil surface should be made smooth with the

back of a shovel (Fig. 1). No preparation of the soil is necessary other than to break the soil crust when smoothing the surface around the trunk. Do not mound the trees before applying the paradichlorobenzene unless there are indications of borers working in the tree trunk just above the soil level (Fig. 2). The gas generated from the chemical, being heavier than air, will not affect any borers working in the tree above the point where the crystals are placed. Consequently, it is very necessary to place the crystals at least at the level of the



Fig. 1.—Proper preparation of soil around tree before treating with paradichlorobenzene.

topmost borer gallery, and if there are indications of borers working in the tree above the soil level, sufficient soil should be placed around the tree to bring the level up above the gummy exudation before applying the paradichlorobenzene.

### How to Apply Paradichlorobenzene

Paradichlorobenzene should be applied in a continuous band about one and one-half inches wide around the tree (Fig. 3). Avoid placing the crystals against the tree (Fig. 4), or too far from it (Fig. 5). A



Fig. 2.—Borers working in tree above soil level. This tree should have been mounded before applying the paradichlorobenzene.

shovelful of soil when covering the ring.

ring of crystals placed from one to one and one-half inches from the tree trunk has been found to be most satisfactory. Several shovelfuls of soil free from stones, sticks and trash should be placed on the crystal ring and packed with the back of a shovel (Fig. 6). This packing after the soil is placed on the chemical is important in order to prevent surface loss of the gas and to prepare a mound which serves as a container for the gas. The mound also prevents surface washing of the crystals. Avoid pushing the crystals against the tree trunk with the first

### Later Attention to Mounds

Where paradichlorobenzene has been used on three and four-year-old peach trees the mounds should be torn down twenty-eight days after treating as an added precaution against injury to trees of that age. If the weather conditions are normal during October and November it will not be necessary in the South to tear down the mounds from around the trees five years of age and older four to six weeks after treating with paradichlorobenzene, as was formerly advised. If the temperatures are unusually low or if an abnormal precipitation occurs during these months, it would be advisable to tear down the mounds from around the older trees during the latter part of November in order to remove the unspent crystals. Under normal weather

conditions during October and November in the South the one ounce dose will entirely evaporate in six to eight weeks. The borers are usually all killed within three or four weeks after applying the material.

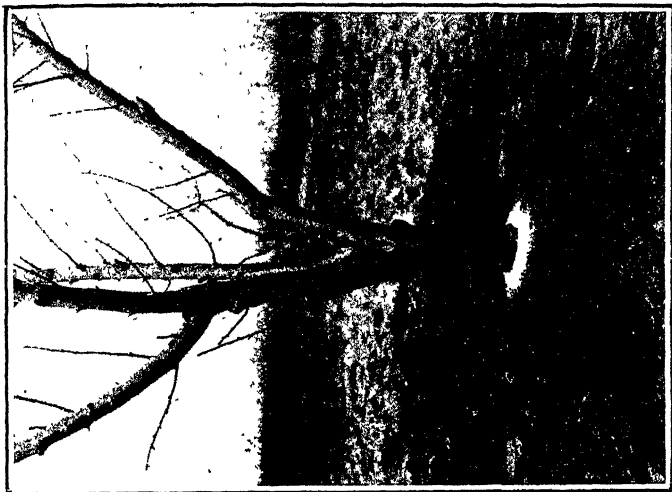


Fig. 4.—Improper treatment. The crystal ring should be at least one inch from tree trunk.

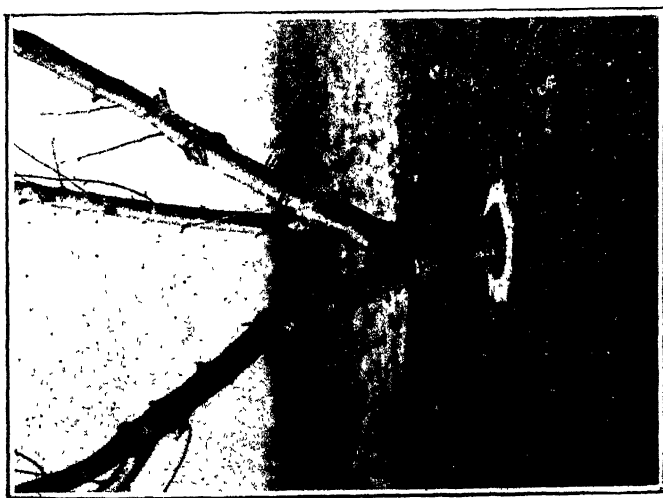


Fig. 3.—Proper treatment. Continuous ring  $1\frac{1}{2}$  in. wide and one inch from the tree trunk.



Fig. 6—Several shovelfuls of soil should be placed on the crystals and packed



Fig. 7—Improper treatment. Crystal ring is placed too far from the tree trunk



Fig. 7.—Uncover the base of three and four year old trees 28 days after applying paradichlorobenzene.

### THREE EXTREMELY SERIOUS DISEASES OF NURSERY STOCK

By

D. W. Grimes, Nursery Inspector, and  
Henry D. Barker, Associate Plant Pathologist,  
Mississippi State Plant Board.

The results of the nursery inspection work in Mississippi have shown that crown gall, root knot, and apple blotch are undoubtedly the most serious plant diseases occurring in the nursery. Shipments received from Alabama and other neighboring Southern States, together with reports from the authorities in such states, indicate that there also these diseases are causing the nurserymen much worry.

The situation is exceedingly serious with crown gall and root knot, since these two diseases affect so many host plants, and since they can not be controlled by ordinary protective measures such as spraying. In fact, these two diseases are driving some nurserymen out of business or else are markedly limiting them in many cases to certain more resistant types of plants. Once the organisms causing these diseases

becomes established in the soil, continuous cropping of susceptible hosts causes the soil to become so thoroughly infested that such plants can not be grown without becoming infected. Ignorant or careless methods of handling these diseases may prove very costly to the nurseryman. Because of all of these features, it is almost imperative that the successful nurseryman familiarize himself with the susceptibility of his various stocks and varieties and the crops used for rotation as well as the manner in which the disease is transmitted and the most applicable methods of control that have been worked out by able investigators.

Blotch, once it becomes established in the orchard, is one of the most destructive diseases of apples in Mississippi. The disease has not become very prevalent in the State. Consequently, upon the nurseryman rests considerable responsibility in preventing the further spread of the disease. For these reasons and particularly because apple blotch is not so familiar to the average nurseryman, it is discussed in slightly more detail as to cause, symptoms, and general control measures than was deemed necessary for crown gall and root knot.

#### Crown Gall, *Bacterium tumefacens*

This disease has been known in Europe for more than fifty years, although the cause was not known. Most of the experimental work on this disease has been performed in the United States, much of it by Dr. Erwin F. Smith, who discovered the bacterium causing the disease. Due to the fact that the cause and symptoms of the disease are so generally known it is felt that it will not be necessary to discuss these in this brief article.

Investigational work on crown gall carried on in several states points to the fact that stone fruits such as almonds, apricots, peaches, and plum, are injured severely from crown gall infection. The opinions as to the seriousness of crown gall on apple seems to be divided among both plant pathologists and nurserymen. Crown gall on grapes, raspberries, blackberries, roses, poplars, chestnuts, and walnuts has been reported as serious.

In Mississippi nurseries, we have found crown gall to be very injurious to peaches, apples, privets, and roses. The following list of plants has been found infected with crown gall in Mississippi nurseries, some of which it will be noted are new hosts for crown gall:

<i>Host</i>	<i>Variety or Species</i>	<i>No. Nurseries Infected</i>	<i>Severity of Infection</i>	<i>Remarks</i>
Apple	Early Harvest, Ford, Horse, Red Margaret, Early May, Carolina Red June, Sweet Red June are apparently more susceptible than Arkansas Black, Yates, Red Astrachan, Delicious, Winesap, Stayman Winesap, and Rome Beauty	9	Up to 90%	Heavy infection on old nursery site where soil was infected. Another case due to overflow.
Althea		1	Slight	
Buddelia		1	Very slight	Somewhat doubtful.
Cape Jessamine		1	One plant	On twig—none on crown or roots.
Euonymus	Euonymus japonica.	1	Moderate-General	
Peach	No varietal difference noted. Most common varieties very susceptible	8	Up to 99%	99% infection on sloping ground from infected soil above. Another case due to overflow.
Pear		1	One plant	
Pecan	Success	1	Ten plants	Old nursery with apparent infection center since infected plants were quite closely grouped.
Plum		1	Light	
Privet	Most serious on <i>L. lucidum</i> . Also found on California, Nepals, and Amoor River Privets.	6	Up to 95%	95% infection on grafted plants. (California privet stock.)
Quince		2	Heavy	Numerous aerial galls.
Raspberry	Everbearing	1	Heavy	
Rose	Stocks and different varieties. (Ophelia most heavily infected variety noted.)	8	50% maximum	Aerial infection common due to infected pruning knives; infected soil frequent source of inoculum.



Our observations made relative to the difference in injury of crown gall to apples and peaches leads us to agree with different investigators that crown gall is more serious and general on peaches than apples.



Fig. 8.—Crown gall on apple. Taken from a nursery in which a 90 per cent infection occurred. Soil infection from old nursery. (Original.)

Crown gall, in addition to the injury caused by the disease, invites nematode or root knot and many other serious diseases that attack weakened plants more commonly than vigorous ones. Crown gall itself attacks rapidly growing plants more readily than those making a slow growth.

#### Control Measures

This disease is difficult to control by ordinary protective measures. This adds to the seriousness of the disease and accounts for the fact that such diseased plants are rejected in nursery shipments. The disease can be controlled or at least kept in check by careful attention to the following established control measures.

**Disinfection.**—In Texas Bulletin No. 211 a description is given of experiments in disinfecting nursery stock as a preventive against crown gall.

The disinfectant used for peach trees in orchard and nursery was:  
3½ ounces copper sulphate to 26 gallons water,  
Exposing for 2 hours.

The disinfectant used for apple trees in orchard and nursery was:  
1 pound copper sulphate to 26 gallons water,  
Exposing for 2 hours.

According to the experiment the disinfectant seems to be effective for the apple. It is probable that the same treatment would be effective for other nursery stock.



Fig. 9.—Hairy root on apple caused by the crown gall organism. (Original.)

Where shipments of fruit trees entering Mississippi have been intercepted and found to contain a few trees infected with crown gall, such diseased trees are removed from the shipment and the others are allowed to continue to consignee. It would probably be an excellent idea, as a prevention, to prepare a disinfectant like the above and dip all nursery trees from nurseries where crown gall was found during field inspections, as well as clean trees in shipments from which crown gall plants have been discarded.

We have traced the spread of crown gall from one point in a nursery to another to be due to the knives used by the propagator. (Fig. 13.) Such knives were not disinfected as they should have been. Knives used in propagation should be dipped frequently in a four or five per cent solution of formaldehyde.

**Stock Resistance.** Certain varieties of various plants have been observed to be more resistant than others. Exhaustive studies, however, have not been made on varietal susceptibility. Consequently further observations by the nurseryman himself might prove valuable. Wherever possible, resistant stocks should be used. Resistant stock for stone fruits may be found in *Domestica* and *Damson* plums.

**Location of Nursery.** The nurseryman should not select a site that is not well drained, as it has been shown in a Mississippi nursery that an overflow caused the spread of crown gall over the nursery. Also, nurseries should not be started on top of a slope, and then moved down the slope, as infected soil will be washed down and cause infection. One instance in which infection has been due to this procedure has been noted in a Mississippi nursery. If rolling land is to



Fig. 10.—Aerial crown gall on apple. Grafting wood or cuttings should not be made from crown gall plants of any kind since secondary tumors may result from tumor strands. (Original.)

be used for a nursery, start at the bottom of the slope for the first harvest of stock and then move up the slope for future crops of nursery stock. One other very important point is that the nursery should be located as far away from the orchard as possible in order to prevent the spread of this and other diseases and also insects from the orchard trees to the nursery. Furthermore, nursery plants very susceptible to crown gall, root knot and scale insects should not be planted or lined out close to other nursery plants less susceptible.

**Clean Soil and Crop Rotation.** Very susceptible varieties of plants should be planted on clean soil (i. e. soil that has not grown susceptible plants for two or three years previously). Rotation to resistant crops



Fig. 11.—Crown gall on peach. Taken from a nursery showing a 99 per cent infection. (Original.)

for two or three years to rid the land of the organism producing crown gall is not always practicable, but may be used to great advantage wherever this is possible. In addition to the various susceptible nursery plants listed above, the following crop plants should be avoided in rotation: alfalfa, beet, clover, cotton, salsify, and turnip.

**Packing House and Field Inspection.** Thorough inspections should be made in the packing house, and all diseased plants discarded. In the field a plant to plant inspection should be made of all plants for

crown gall above ground. Plants at intervals should also be dug up for examination of crowns and roots. All diseased plants found should immediately be destroyed to prevent further spread.

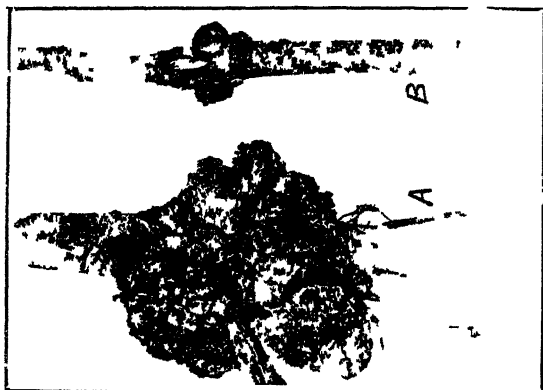


Fig. 12.—Crown gall on pecan. (A) Old gall showing what is sometimes called 'soft canker'. (B) Young gall or 'hard canker'. (Original)

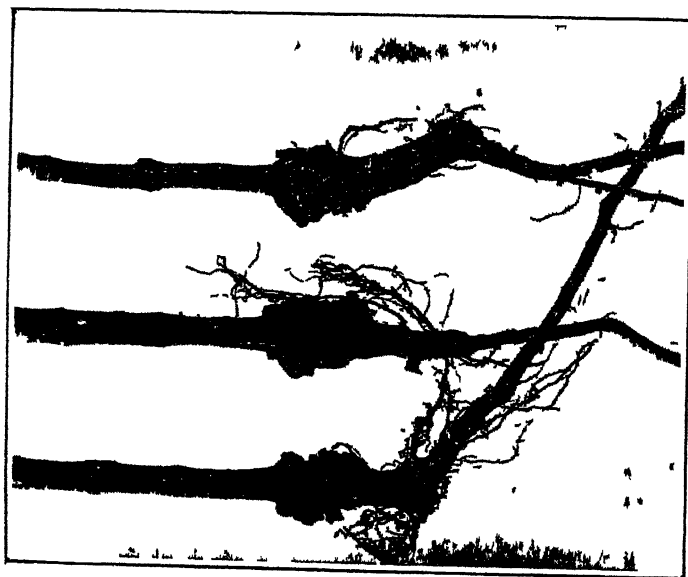


Fig. 13.—Crown gall on privet taken from a nursery of *Ligustrum* grafted on California stock. A 90 per cent infection occurred at the graft union. (Original)

**Root Knot, *Heterodera radiculicola***

Many nurseries and greenhouses in Mississippi are infected with a disease known as root knot. This disease is serious and causes immense damage to a great variety of plants in the Southern States, particularly in the southern portion of the Gulf States. When plants are infected with root knot caused by nematodes, the roots become enlarged, distorted or deformed. This hinders the growth of the plants, and very frequently results in the death of the attacked plants.

The following plants in Mississippi nurseries have been found infected with root knot:

Host	No. Nurseries Infected	Severity of Infection	Remarks
Althea	----- 1	Moderate.	
Apple	----- 1	Moderate.	
Begonia	---- 4	Severe, locally and generally.	
Deutzia	----- 1	Severe, locally.	
Euonymus	-- 1	Moderate.	
Figs	-----21	Up to 100%-----	Very susceptible.
Forsythia	--- 3	Moderate.	
Hibiscus	---- 1	Moderate, local.	
Hydrangea	- 1	Severe -----	Soil.
Justicia	---- 1	Moderate.	
Peach	----- 9	Up to 100%-----	Very severe in southern part of state.
Peony	----- 1	95% infection.	
Plum	----- 1	Moderate, local.	
Privet	----- 2	Moderate, local -----	California only.
Rose	----- 1	Light -----	Quite susceptible despite the fact that there is only one report from a Mississippi nursery.
Strawberry	--1	Trace -----	On old garden spot on Klondike.
Weigelia	---- 1	Very heavy.	

From the above list of plants, it may be noted that althea, apple, deutzia, euonymus, forsythia, hydrangea, justicia, plum, privet and weigelia have not been reported previously as hosts of nematodes.

It might be of value to list all host plants known to be attacked by root knot including the ones found in Mississippi and also some plants that are known to be resistant. They are as follows:

## Plants Susceptible to Root Knot

*Field Crops*

Alfalfa	Cowpea	Pumpkin	Kudzu	Sweet
Clover	Field Pea	Soy Bean	Vetch	Potato
Cotton	Flax	Sugar Beet	Sugar Cane	Tobacco

*Ornamental and Drug Plants*

Begonia	Coleus	Ginseng	Justicia	Violet
Cineraria	Dahlia	Goldenseal	Rose	
Clematis	Hollyhock	Peony	Sweet Pea	

*Truck Crops*

Asparagus	Celery	Irish Potato	Okra	Spinach
Bean	Collard	Garden Pea	Onion	Squash
Beet	Cucumber	Lettuce	Pepper	Sunflower
Cantaloupe	Eggplant	Muskmelon	Radish	Strawberry
Cabbage	Garden Beet	Mustard	Rape	Tomato
Carrot			Salsify	Watermelon
Cauliflower				

*Woody Plants*

Almond	Cherry	Hydrangea	Privet
Althea	European Elm	Mulberry	Quince
Apple	Euonymus	Persian Walnut	Weeping Willow
Catalpa	Forsythia	Peach	Weigelia
Deutzia	Fig	Pecan	Japanese Persimmon
Old World Grapevine	Hibiscus	Plum	

## Plants Not Susceptible to Nematode

*Farm Crops and Legumes*

Barley	Corn	Pearl Millet	Timothy
Beggarweed	Crab Grass	Redtop	Velvet Bean
Brabham Cowpea	Iron Cowpea	Rye	Wheat
Broom Corn	Peanut	Sorghum	Winter Oats
Millet			

## Dissemination of the Nematodes

The nematodes may be transported from one locality to another in many ways, as in the roots of growing plants, and by means of tubers, bulbs, and nursery stock. They can be carried from field to field by such agencies as running water and the soil which clings to agricultural implements, the feet of men, and the hoofs of animals.

### Control Measures

The disease may be eliminated in greenhouses and seed beds when they are not being used by the application of steam under high pressure or by the introduction of uninfested soil into clean, whitewashed benches

In the nursery or orchard, the problem is more difficult. Careful attention of the nurseryman should be directed to the following recommendations



Fig 14—Root knot on apple—not commonly infected (Original)

**Location:** Since one method of spreading the disease is by means of drainage water, the same precautions should be taken as advised for crown gall. It is well to bear in mind that root knot flourishes best in light sandy soil. It can not thrive in heavy soil or in those that are constantly wet. Therefore, for growing the more susceptible varieties of plants, soils containing a good percentage of clay, that is, more clay than sand should be selected.



**Rotation:** The most satisfactory method of combating the nematode in fields not planted to perennial crops is by the cultivation of immune crops for a period of two to three years and by carefully killing all weeds and susceptible plants in which the nematode can live. A desirable rotation is that where winter grains alternate with either Iron or Brabham cowpeas, velvet beans, or beggarweed. Care must

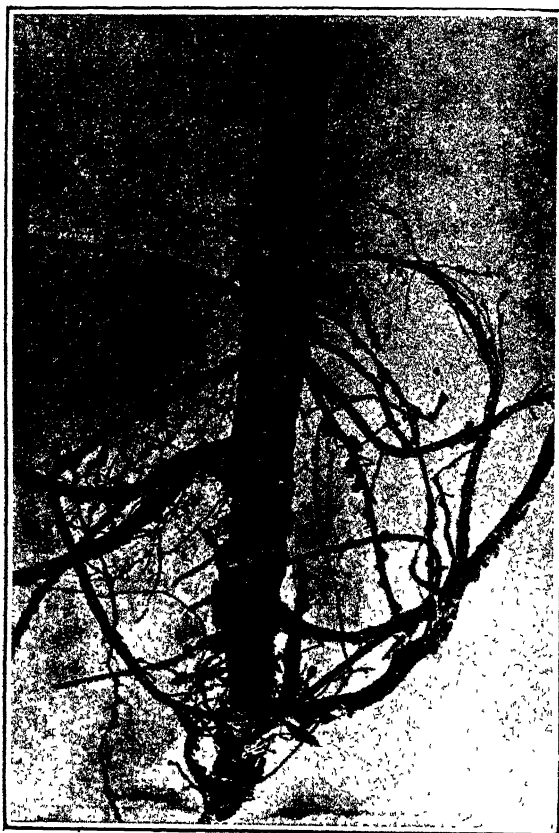


Fig. 15.—Root knot on peach taken from a heavily infected nursery. Many trees practically dead. (Original.)

be exercised to prevent running water, implements, animals, etc., from bringing the nematode from nearby infested fields: In order to rid land of root knot, do not grow any of the plants which are known to be attacked by the disease as shown in the list of susceptible plants.

Starving the nematodes by keeping the land free from all vegeta-

tion for two years is an effective control method, though often impracticable.

**Soil Treatment:** In badly infested soil where rotation or fallowing is not practicable, it may be desirable to free the land by chemical treatment. The Florida Station reports good success with calcium cyanamid at the rate of one thousand to four thousand pounds per acre. This material now costs about \$75.00 per ton. However, it contains as high as twenty-four per cent ammonia, so that where high fertilization is required this source of nitrogen is about as cheap as any of the common commercial fertilizers.

There has been some experimental work done on peaches in other states with high applications of sulfur, which gave promise of control. The Mississippi Experiment Station and State Plant Board are now testing this method of treatment and will report the results of their findings as soon as possible.

Disinfection of the soil with formaldehyde has been used with success in case of very local infestations where only a few square feet of soil around an infected plant needed treatment.

**Fertilization and Cultivation:** Weak, unthrifty plants are more readily attacked than vigorous, healthy ones, although it should be remarked that vigorous plants may be severely attacked. High fertilization and cultivation materially aid plants to resist the attack and to overcome the disease by inducing rapid growth.

**Treatment of Diseased Stock:** Nursery plants that show evidence of root knot are not allowed to be moved or sold. It is, therefore, advised that all plants found diseased during field and packing house inspections be destroyed. The methods of inspections recommended for crown gall are applicable here.

Where valuable nursery stock is generally infected with root knot, it is recommended that it be hand culled and the disease-free plants be dipped in formaldehyde solution under the supervision of a Plant Board Inspector, and transplanted to nematode-free soil. The diseased plants should be destroyed unless they are particularly valuable, in which case it may be attempted to save them by cutting off the roots, dipping in formaldehyde solution and transplanting to free soil.

### APPLE BLOTCH. (*Phyllosticta solitaria*)

#### Occurrence in Mississippi Nurseries

During the fall of 1921 apple blotch was noted for the first time in a Mississippi nursery. Only two rows of nursery stock, two-year-old apple trees, were found infected. These were destroyed. The nurseryman had older orchard trees which were also infected with blotch, and since these trees were located near the nursery, it seems quite likely that the disease may have spread from the orchard to the nurs-

ery. However, the disease might have been introduced to the nursery on seedling stocks purchased from an out-state nursery. Since the finding of the apple blotch in a Mississippi nursery in 1921, seven other infected nurseries have been found. This included two pear nurseries where a few infected plants were found, and five apple nurseries where infection was more general. As a rule, the seedlings have been found to be more seriously affected than grafts.

The following table shows the number of nurseries found infected with apple blotch, the severity of infection, etc.:

Host	No. of Nurseries Infected	Severity of Infection	Remarks
Apple-----	6	Up to 50%-----	Highest on certain seedlings.
Pear-----	2	Trace.	

#### Cause of Blotch

Apple blotch is caused by the fungus *Phyllosticta solitaria*, E. & E. The fungus lives over winter in the twig cankers, where it is perennial, and in the spring produces spores which ooze out in great numbers from little black raised points or pycnidia. These spores are carried to the fruit by rains, wind, and perhaps insects.

#### Symptoms of Disease

Blotch is found on the fruit, twigs, and leaves. It is also evident on the older limbs in the form of roughened bark or cankers (Fig. 16-B.). On the twigs superficial cankers are produced. These are especially evident on fruit spurs (Fig. 16 A. C.) and water sprouts (Fig. 16-D). If the disease is present in an orchard it is found most easily by examining any water sprouts that may be present. The cankers are not evident from infections of the current year until late in the season when they appear as small, olive-brown spots. The following season, however, the spots on the twigs are sharply defined. The central area is slightly raised, light tan in color, with pimples (Pycnidia) scattered over the surface. Surrounding this occurs the reddish brown area of the current season's development. Upon older limbs and twigs, the cankered bark becomes roughened, with cracked-like bands or furrowed areas which are quite characteristic.

#### Control Measures

Satisfactory control of this exceedingly serious disease of apples may be effected in the orchard by means of careful and judicious spraying, proper pruning, fertilization, and the use of resistant varieties.

Usually three applications of 3-4-50 Bordeaux mixture or applications of lime-sulfur (summer strength) are necessary to control the disease. The first spraying should be made about three weeks after the petals fall. This is the most effective application since it is applied just before the majority of the spores are to be liberated. The

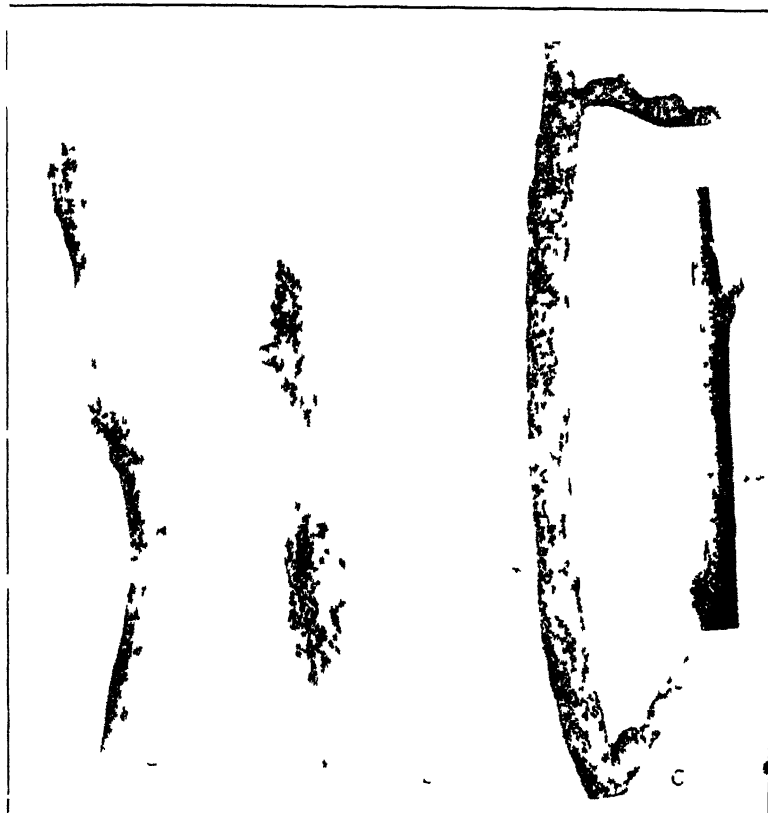


Fig 16—Blotch: (a) On Fruit Spurs, (b) Old Cankers on Limbs, (c) On Young Branches, Showing Roughened Bark, (d) On Water Sprout, Showing Pycnidia of the Fungus on One-and-Two-Year-Old Lesions. (After Anderson, H. W., Ill. Circular No. 241)

second application should be given about two weeks after the first and the third about three weeks thereafter. During seasons of wet weather, lime-sulfur (summer strength) may be substituted for Bordeaux mixture in order to avoid foliage burning. Continuous care of the orchard from year to year as to matters of pruning and the removal of water sprouts and surplus branches will aid the effectiveness of

spraying by reducing the number of hibernating places of the fungus. Trees thus sprayed carefully from year to year are usually free of cankered limbs. It is advised that weak trees, when infected with blotch, should have an application of nitrogenous fertilizer at the time the blossoms are in the pink.

The above control measures do not apply to the nursery. Infected nursery stock, seedlings, or grafts, should be discarded.

Observations on varietal susceptibility have been made as follows: *Highly susceptible*, Duchess, Oldenburg, Stark, Smith Cider, Mann, Northwestern Greening, Maiden Blush, Missouri Pippin, Mammoth Black Twig, and Limber Twig; *Moderately susceptible*, Ben Davis, Gano, Yellow Transparent, and Rome Beauty; *Moderately resistant*, Jonathan, Winesap, York Imperial, Delicious, and Grimes.

Of the above named varieties that are recommended for Mississippi, there are Winesap, Yellow Transparent, Black Ben Davis, Rome Beauty, and Delicious.

#### Valuable Bulletins On the Above Diseases

Each nurseryman should obtain a copy of Texas Bulletin No. 211 and Montana Bulletin No. 121 on Crown Gall; U. S. D. A. Farmers' Bulletin No. 648 on Root Knot; and Illinois Circular No. 241 on Apple Blotch.

### SPREADING ARGENTINE ANTS IN PLANT SHIPMENTS

By  
M. R. Smith

The spread of the Argentine ant is due to two agencies, natural spread through crawling and flight, and unnatural spread, due to man through commercial transportation. Natural spread, although important, is never so serious as the increase in territory due to man, since the former embraces only a spread or increase of a few hundred yards a year or more around the edges of the infestation, except in cases of floods, whereas commercial spreads may be responsible for a new infestation many miles from the original one. Commercial spread may be accomplished through shipments in boats, trains, or other means, principally through uninspected nursery stock and plant shipments.

The value of inspection of parcel post and express shipments of nursery stock for injurious insects and diseases cannot be overestimated. Within the past two years the writer has had opportunity to observe the interceptions of not only Argentine ants in nursery stock shipments but also the interception of another well-known house ant which might have become established in Mississippi had it not been for the diligence of our inspectors.

In one town in Mississippi it has been definitely proven that the Argentine ant infestation there was due to a shipment of roses from

New Orleans which was received years ago, before our present Plant Board laws were enacted. Last year this town spent approximately \$400 in fighting the ants and will probably put on another campaign this fall. An inspection of the roses at the time they were sent to this town would, without doubt, have resulted in the interception of this annoying and destructive house ant.

Several months ago another one of our inspectors located at Gulfport intercepted sexed and worker forms of the Argentine ant in a shipment of nursery stock consigned from a large town in an adjoining state to a town in this state. If this shipment had not been inspected, there is very little doubt that the ants would have started a new infestation in the town to which this shipment was consigned. The town mentioned contains approximately 15,000 people and if the ants had become established there, the amount of annoyance and damage they would have caused each year would be much greater than the amount of the inspector's salary who intercepted the shipment containing them.

During the past year a floral concern in Columbus, Mississippi, sent to this office for inspection plants of the so-called African Ox-eye Daisy consigned to them from Hawaii. In the soil about these plants were found all stages of *Pheidole megacephala*, an ant which was formerly a bad house pest in the Island of Maderia until it was replaced by the Argentine ant.

It is undoubtedly true that many of the seventy Argentine ant infestations in this state are due to shipments of nursery stock into Mississippi before our present system of inspection went into effect. Besides the Argentine ant we have six other imported ants in the state. Since most ants nest in soil, it behooves us in inspecting to always carefully examine the soil around the roots of the plants, or the ants there are afforded every protection and are not always easy to find. People who live near towns infested with Argentine ants should be especially careful about buying potted plants and taking them to their homes without first examining the plants and soil to see if ants are present.

### MEXICAN BEAN BEETLE IN MISSISSIPPI

During April and May the Mexican bean beetle was discovered in Mississippi for the first time at two communities in Itawamba County, near Eastman and Tremont, and in June was found near Dennis, in Tishomingo County. At Eastman the beetles were found on the properties of W. H. Barkley, D. W. Wood, and W. F. Graham, the first two adjacent and the third property not over a mile distant, though intervening farms appeared uninfested. At Tremont the beetles were found on the farms of C. P. Chamblee and W. I. Townsley. These properties are about 5 miles apart and are 8 miles north of the infestation near Eastman.

The latter part of June, Inspector R. B. Deen, who had reported the infestations in Itawamba County, also discovered the beetles on the farms of J. P. Hughes, H. S. Foote, J. G. Ginn, and J. W. Ginn, at Dennis, in Tishomingo County. All four properties are very close together and are only a mile from the Alabama line near Red Bay. The most plausible theory for the beginning of these infestations, both in Itawamba and in Tishomingo counties, is that the beetles were brought in on hay used in this section during the construction of the Bankhead Highway, as several of the infested farms are located on this highway. The hay came from Alabama and in all probability from an infested area, though as Alabama has no quarantine against the alfalfa weevil, the hay could have been shipped from the beetle-infested areas of the West.

As the infestation in all cases has been rather light, the owners of the properties have been asked to keep the beetles reduced as much as possible by picking off and destroying all stages. Posters have also been placed in several localities in both counties, and with all the inhabitants fully aware of the destructive nature of the pest, it is probable that very little spread westward will occur except through natural means. Scouting in these counties and also in Lee, Alcorn, Prentiss, Monroe, and Lowndes counties, will be continued as much as other work will permit and it is quite probable that other infestations will be discovered near the Alabama line.

### FOULBROOD IN EAST MISSISSIPPI

The discovery in May of American Foulbrood in Noxubee County, right in the midst of the largest commercial beekeeping center of the state, was quite alarming at the time, as no recent scouting had been done in that section and fears were entertained that the disease might be widespread in the Prairie Belt. However, rather thorough subsequent scouting has shown only 6 infected properties, 5 of them within a radius of 3 miles, the other some distance away. In every case the beekeepers have co-operated heartily and the infected colonies have been destroyed at once and burned completely. Sufficient reinspections will be made during the next quarter to give ample assurance that the disease is no longer present, or to eradicate any further infection that might start. This infection was probably due to the sale in Macon of honey from infected apiaries in Alabama and to the subsequent purchase of colonies near Macon by a large beekeeper in the county, though the presence of disease in a few of the apiaries could not be satisfactorily explained in this way.

A sample taken in May from an apiary in Alcorn County was determined as European Foulbrood, but a reinspection a month later showed no disease present. The county will be extensively scouted during the next quarter to determine if any other infection exists.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....	Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## PLANT ACT VIOLATOR FINED

After being previously warned not to sell uncertified sweet potato plants in Mississippi, a Memphis peddler was recently arrested on the streets of Coldwater, in Tate County, while selling plants. Inspector T. F. McGehee, on whose warrant the arrest was made, examined the peddler's plants and found black rot in the very first bundle opened.

The city officials, after Inspector McGehee had explained the purpose of the sweet potato inspection service and the splendid results that have been obtained in reducing the loss from black rot and stem rot, decided that the peddler had deliberately violated the Plant Act and promptly fined him \$25 and costs of the court, a total of \$31. With city officials co-operating so promptly and effectively with the Plant Board, it will be only a short time until irresponsible itinerant peddlers of plants and fruit trees will cease to infest the state.



## APLARY INSPECTION REPORT

For Period April 1-June 30

<i>County—</i>	<i>Frame Hives</i>	<i>Box Hives</i>	<i>European Foulbrood</i>	<i>American Foulbrood</i>
Alcorn .....	102	--	1	--
Bolivar .....	237	11	5	--
Forrest .....	350	22	--	--
Hancock .....	1	35	--	--
Harrison .....	136	7	--	--
Itawamba .....	--	26	--	--
Lauderdale .....	94	21	--	--
Lee .....	258	10	--	--
Lowndes .....	730	--	--	--
Marshall .....	32	--	--	--
Monroe .....	9	--	--	--
Noxubee .....	1527	69	--	23
Oktibbeha .....	56	--	--	--
Pearl River .....	242	87	--	--
Pontotoc .....	27	--	--	--
Sharkey .....	19	2	4	--
Sunflower .....	90	13	8	--
Tishomingo .....	20	--	--	--
Washington .....	515	13	29	41
<b>Total</b> .....	<b>4454</b>	<b>316</b>	<b>47</b>	<b>64</b>

## NURSERY INSPECTION REPORT

For Period Beginning April 1, 1923 and Ending June 30, 1923

By D. W. Grimes, Nursery Inspector

Number of nurseries inspected .....	103
Acreage in nurseries inspected .....	513 1/80

## Amount of Nursery Stock Inspected

Grafted and budded pecans .....	47,225
Seedling pecans .....	7,750
<b>Total pecans</b> .....	<b>54,975</b>
Citrus trifoliata .....	1,023,000
Orange .....	49,980
Grapefruit .....	380
Miscellaneous citrus .....	2,576
<b>Total citrus</b> .....	<b>1,075,936</b>

Apples .....	15,600
Pears .....	50,650
Peaches .....	29,500
Japanese persimmon .....	725
Grapes .....	20,800
Figs .....	7,170
Strawberry .....	2,723,500
Mulberry .....	1,490
Miscellaneous fruit .....	7,352

Total fruit stock (citrus excluded).....2,856,787

Roses .....	174,710
Other ornamentals .....	1,045,894

Total ornamental stock.....1,220,604

Grand total of plants inspected during period.... 5,208,302

### QUARANTINE INSPECTION REPORT

For Period From April 1 to June 30, 1923

By Geo. F. Arnold, Quarantine Inspector

#### Ships and vessels inspected:

From Foreign ports .....	27
From U. S. ports .....	20
Total.....	47

#### Parcels inspected:

Arriving by water .....	0
Arriving by land, express, freight, wagon, etc.—	
Passed .....	603
Treated and passed .....	4
Returned to shipper .....	6
Contraband destroyed .....	41
Total.....	654

#### Arriving by mail—

Passed .....	1233
Treated and passed .....	19
Returned to shipper .....	12
Contraband destroyed .....	47

Total.....1311

Grand total of parcels inspected..... 1965

Number of parcels on hand June 30, 1923, pending determination as to final disposition-----	7
Total parcels passed -----	1836
Total parcels treated and passed -----	23
Total parcels returned to shipper -----	18
Contraband destroyed -----	88
Grand total -----	1965

## CITRUS CANKER SCOUTING REPORT

For the Period April 1, 1923 to June 30, 1923

Number of counties in the state which have at one time or another since 1916 shown canker-----	4
Number of counties showing canker April 1, 1923 to June 30, 1923. -----	0
Number of grove trees inspected April 1, 1923 to June 30, 1923-----	21,672
Number of nursery trees inspected April 1, 1923 to June 30, 1923. -----	36,563
Number of <i>C. trifoliata</i> inspected April 1, 1923 to June 30, 1923-----	13,717
Total number of grove trees found infected June 1, 1916 to June 30, 1923 -----	3,117
Total number of nursery trees found infected June 1, 1916 to June 30, 1923 -----	51,167
Number of properties infected during 1917-----	47
Number of properties infected during 1918-----	14
Number of properties infected during 1919-----	4
Number of properties infected during 1920-----	0
Number of properties infected during 1921-----	1
Number of properties infected during 1922-----	8
Number of properties infected during 1923-----	0
Number of new properties infected during 1917-----	12
Number of new properties infected during 1918-----	1
Number of new properties infected during 1919-1920-----	0
Number of new properties infected during 1921-----	1
Number of new properties infected during 1922-----	8
Number of new properties infected during 1923-----	0
Total number of properties found infected June 1, 1916 to June 30, 1923 -----	130
Total number of properties declared no longer danger centers--	123

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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**VOL. 3**

**OCTOBER, 1923**

**No. 3**

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**PUBLISHED BY**  
**STATE PLANT BOARD OF MISSISSIPPI**  
**A. & M. COLLEGE, MISSISSIPPI**

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 8, 1900.

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## PRELIMINARY REPORT

— ON —

# Early Poisoning in Boll Weevil Control

(By T. F. McGehee, Assistant Entomologist, Mississippi State Plant Board, with headquarters at Holly Springs Branch Experiment Station, Holly Springs, Miss.)

It must be emphasized that the method of boll weevil poisoning discussed in this report has been tried in Mississippi only one year and in only one section of the state. It is still in the experimental stage and more experiments will be conducted in the future. However, the tests this year gave such good results and aroused so much interest among the farmers who saw them, that this preliminary report is published with the hope that it will encourage a large number of farmers in various sections of the state to investigate the practicability of this method under their own farm conditions.

The experiments described in this paper were conducted during 1923 at the Holly Springs Branch Experiment Station. The success of this work was due largely to the hearty co-operation and assistance of Prof. C. T. Ames, in charge of the Experiment Station; Mr. H. F. Wallace, of the Station Staff, and Mr. C. G. Wallace, another employee of the State Plant Board.

Eight years of field experimental work in controlling the boll weevil, and a careful study of the spring emergence of weevils from hibernation in its relation to the beginning of square formation, emphasized the necessity for a thorough investigation of the value of early poisoning as a control measure. Briefly, the method discussed herein is the application of calcium arsenate, either in powdered form with a dust gun or as a molasses mixture with a mop, to the terminal buds of the young plants just before any squares form. Another application is made ten days later, preferably of the calcium arsenate dust, as the molasses mixtures do not readily penetrate the bracts of the squares and the weevil mortality is less. Instead of waiting until the weevils have punctured 10% to 15% of the squares before poisoning, as usually recommended, this method of early poisoning kills most of the old weevils before any eggs are deposited. This is not so much to save the early squares, as to prevent the production of the generations of weevils which do so much damage later when squares are abundant and poisoning is less effective.

These experiments were conducted in the hill section of the state, but splendid results were obtained on fertile valley land and it is believed that this method will be equally applicable to Delta conditions. Quite different results might be secured here another year, or under different conditions, but on account of the unusually heavy rainfall during the spring and summer, as shown in Table I, this has been the most unfavorable season for cotton growing in several years, and from the results secured in spite of this, it is believed that early poisoning just before squares form will be profitable wherever weevils are numerous.

TABLE 1.

Weather conditions at Holly Springs, Miss., 1923:

Months—	Rainy Days	Cloudy and Rainy Days	Total Rainfall Each Month	Total Rain fall April 1 to Sept. 10
April.....	13	17	8.99	---
May.....	16	17	11.28	---
June.....	13	14	6.75	---
July.....	12	16	4.60	---
August.....	13	18	3.84	---
First 10 days in Sept..	7	8	2.36	---
<b>Total.....</b>	---	---	---	<b>37.82</b>

Since it is recognized that boll weevils can easily be poisoned while feeding in the terminal buds before squares form, the question naturally arises as to what per cent of the weevils are out of hibernation and in the field by the time the first squares begin forming. From all sources of information available, it appears that squares do not begin to form in any part of Mississippi until about the last of May or first of June. Right here it might be stated that it is very important under boll weevil conditions not to plant some cotton too early, as extra early cotton serves to breed out weevils for the main crop planted later. All cotton should be planted so it will begin fruiting about the same time. According to a record secured in 1914 at Port Gibson, Miss., Trice cotton planted April 14 was just beginning to put on squares during the latter part of May, and 703 weevils per acre were collected on this cotton on June 2. At Holly Springs in 1923, the first square on the earliest cotton on the Experiment Station did not appear until June 16.

Assuming that no squares are formed before the middle of May, let us now see what per cent of the weevils are out of hibernation by that time. By referring to Bulletin 926 of the United States Department of Agriculture, it may be seen that at three points in Texas, three in Louisiana, and one in Florida, in seven different seasons, over 72% of the weevils that emerged were out of hibernation by May 16. From

a recent report received from Mr. B. R. Coad at Tallulah, La., it was found that in eight other years, besides those mentioned above, the weevil emergence at Tallulah averaged 70.2% by May 16 and 83.6% by May 23, for the eight-year period. The above records were secured from cage tests. During the spring of 1923, the State Plant Board carried on emergence studies at several points in Mississippi to secure emergence records under actual field conditions. At Holly Springs, 76.2% of the weevils that emerged were in the field by the time the first square was just beginning to form on cotton planted April 24, which is the earliest date of planting recommended for this latitude by the Experiment Station. This was an unusually late spring, but weather conditions which would cause the weevils to be late in emerging would very likely also cause late fruiting of cotton.

From the above information it seems safe to say that on an average 70% of the weevils that emerge from hibernation are in the field before the first squares begin to form. Since it has been demonstrated again and again that an application of poison at this time will kill practically every weevil in the field, it is obvious that this early poisoning is very important, preventing, as it does, more than 70% of the over-wintered weevils from raising any progeny at all to damage the crop later in the season. As practically all the weevils have emerged from hibernation by the time of the second application ten days after the first, these two poisonings almost completely clean the field of weevils until the general movement begins about the first of August.

In all of the following tests where dry calcium arsenate was used it was dusted on the cotton with a hand dusting machine while the cotton was wet with dew or rain. The cost of the calcium arsenate was figured at 18 cents a pound, the labor for men at 17½ cents per hour, and for women 10 cents per hour. The commercial molasses mixture cost 77 cents per gallon, and the home mixture of molasses and calcium arsenate 32 cents per gallon. Incidentally, in a number of cage tests, these highly-advertised commercial mixtures failed to show any special attraction for weevils. The molasses mixtures were applied with a small mop made by tying a rag on a small stick about 3 feet long and ½ inch in diameter. Larger mops wasted too much poison. In finding the value of the cotton it was considered as one-third lint, valued at 30 cents a pound, and the seed at \$50 a ton. All conditions in the field were practically the same for all the plats except where otherwise stated.

In most cases it was necessary to conduct these tests on small plats so that other conditions would be about the same, and so as not to interfere with other experiments on the same land. The best results could not be expected from small areas like these, as the weevils bred on the checks moved into and caused a reduction in the yield of the poisoned plats, and these plats in turn protected the checks and assisted them in yielding more cotton. The yields secured under such conditions indicate that better results may be expected from the proper



treatment of large areas. This was found to be true in the treatment of several large isolated fields.

Some of the applications made on these plats were wasted, as it was thought at first that there would be a heavy movement of weevils into the poisoned cotton from the check plats, but this movement proved to be so much lighter than was expected, that the extra applications of poison were unnecessary.



Fig. 1.—The right stage for making first poison application—just

Field No. 1—Emergence Studies  
before squares form.

The object of these studies was to secure information which was to form the basis for other experimental work in controlling the boll weevil. Most weevil hibernation and emergence records secured heretofore have been made under cage conditions, that is, a large number of weevils were collected from the field in the fall and placed under cages with rubbish for protection during the winter, and emergence records made in the spring as the weevils emerged from this rubbish. This condition at best is abnormal.

In order to determine the progress and date of complete emergence of the boll weevil from winter hibernation under actual field conditions, a small plat containing .21 of an acre was planted on the Experiment Station on April 24th in Express 350. It was located near splendid hibernation quarters, about one hundred yards from any other cotton, and was the earliest cotton planted in that immediate vicinity. This field was examined at irregular intervals but no weevils were found until May 30th, when every plant on the whole plat was carefully examined and two weevils were found. After this date every

plant in the plat was carefully examined daily except Sundays, until after the first of July, and the weevils collected. Table 2 gives a summary of these studies.

From Table 3 it will be seen that no weevils or weevil signs were found in this plat until August 6th, after the picking of weevils had been discontinued and the general movement had begun. The yield obtained compares favorably with yields on poisoned plats on similar soil, but the labor required for picking the weevils makes this method impractical as a control measure.

#### Field No. 1—Boll Weevil Emergence Studies

Variety—Express 350.

Date of Planting—April 24th.

Area—.21 acre.

Treatment—Weevil picking for emergence record.

TABLE 2—SUMMARY

Date—	Weevils Emerged Each Day			Total Weevils Emerged	Percent Emerged
	Males	Females	Total	to Each Date	to each date
May 30-----	0	2	2	2	1.2
May 31-----	5	1	6	8	5.0
June 1-----	5	3	8	16	10.0
" 2-----	3	1	4	20	12.5
" 4-----	7	4	11	31	19.4
" 5-----	4	4	8	39	24.4
" 6-----	7	4	11	50	31.3
" 7-----	5	4	9	59	36.9
" 8-----	5	9	14	73	45.6
" 9-----	5	7	12	85	53.1
" 11-----	5	2	7	92	57.5
" 12-----	1	4	5	97	60.6
" 13-----	1	0	1	98	61.2
" 14-----	5	10	15	113	70.6
" 15-----	1	3	4	117	73.1
" 16-----	2	3	5	122	76.2 <sup>a</sup>
" 18-----	4	8	12	134	83.8
" 19-----	0	6	6	140	87.5
" 20-----	4	2	6	146	91.2
" 21-----	0	0	0	146	91.2
" 22-----	2	3	5	151	94.4
" 23-----	3	1	4	155	96.9 <sup>b</sup>
" 25-----	3	1	4	159	99.4
" 26-----	0	1	1	160	100.00
" 27-----	0	0	0	---	---
" 28-----	0	0	0	---	--- <sup>c</sup>
" 29-----	0	0	0	---	---
" 30-----	0	0	0	---	---

Average number per acre—762.

<sup>a</sup>—Only two squares just beginning to form on whole plat by June 16th.

<sup>b</sup>—Average .4 squares to plant on June 23rd.

<sup>c</sup>—Average 1.8 squares to plant on June 28th.

TABLE 3—WEEKLY SQUARE INFESTATION RECORD—JULY 19  
TO AUGUST 14.

Date of Infestation Record	Number of Squares Examined	Percent Squares Punctured
July 19 -----	300	0
“ 26 -----	300	0
“ 31 -----	300	0
Aug. 6 -----	300	3
“ 14 -----	300	35

Yield per acre—810 lbs. of seed cotton.—Value \$94.50.

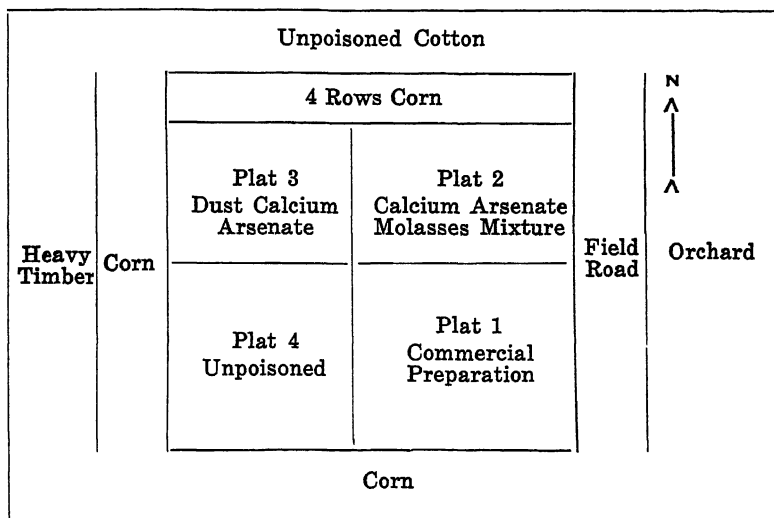
#### Field No. 2.—Comparative Test—Early Poisoning On Valley Land

This field is located in a valley on the Experiment Station. The soil is sandy loam and apparently uniform and very fertile, made so by fertilizers and legumes. Corn was grown on this land during 1922 but cotton was grown adjoining it, due to a two-year rotation. Corn was grown on the south and west sides, cotton on the north, and an orchard on the east side this year. The hibernation quarters for boll weevils consisted of a packing house in which seed were stored during the winter, and several other houses and some timber about a hundred yards away on the west.

This field contained the variety tests and was planted in twenty-five different varieties on May 8th. It was divided into four plats and each plat contained one row of each variety. The object of this test was to compare different methods in early poisoning. Plat 1 was treated with a commercial molasses mixture; plat 2 with molasses-calcium arsenate home mixture (1% lbs. calcium arsenate, 1 gallon of molasses, 1 quart of water—the same strength as claimed for the commercial mixture), applied in buds of cotton with a small mop; and plat 3 was dusted with dry calcium arsenate. Plat 4 was left untreated for a check.

The growth of this cotton was watched and the first application on plats 1, 2 and 3 was made on June 26th, just as the squares began to form. By referring to Table 2, it may be seen that this was the date when all weevils were out of hibernation. Two hundred plants had been examined in each plat on June 21st, and an average of one weevil was found to 100 plants in each of the plats to be poisoned, and one to 200 plants in the check.

Diagram 1—Field No. 2.—Arrangement of Plats



It may be noticed from the above diagram that Plat 1 was somewhat better protected from the weevils on the unpoisoned cotton; however, all of the poisoned plats were adjoining unpoisoned cotton on one or more sides.

It may be seen from Table 4 that the commercial preparation ranked highest, molasses-calcium arsenate next, and the dust method lowest in cost per acre. While the cost of the poison in the dust method is highest, the labor required is so much less that the total cost is lower than either of the other methods; however, the depreciation in the value of the dust machine used in this method has not been figured, neither the time consumed in preparing the home mixture. It is not believed that the molasses has any attraction for the weevil but that it merely serves as a binder for the calcium arsenate, so that it can be applied early in the season in the bud of the cotton any time of day and without any expensive machinery. Weevils probably feed on this sweetened mixture to some extent when they accidentally stumble into it. Molasses mixtures are not expected to be very effective after many squares have formed in which weevils can feed. The calcium arsenate dust is recommended after the first application.

It may also be noticed from Table 4 that the weevil infestation at the time of the first application was practically the same on all of the plats, except that it was slightly lower on the check. After that time there was practically no infestation on any of the poisoned plats until August 8th, after the weevils began coming in from the unpoisoned cotton. The infestation of the check plat gradually dropped until July 26th, as the overwintered weevils died off. After that time the new

crop of weevils began to emerge from the squares and the infestation increased rapidly.

Table 4 also shows that each of the poisoned plats made more cotton and over \$25.00 more money per acre than Plat 4, the unpoisoned or check plat. By going back to the Experiment Station record of yield on these plats in 1921, it was found that Plat 4 made nearly 200 pounds of seed cotton more that year than any of the other plats, that is with practically no boll weevils present. There was not very much difference in the yield of the other plats, but Plat 2 was the lowest in production that year. It may seem from the record of yield that the method used on Plat 1 ranked highest, and on Plat 2 next in effectiveness; but this difference in yield is partly due to the fact that Plat 1 was the least exposed to weevils from unpoisoned cotton, as is shown on Diagram 1. However, the main cause of this difference in yield was the coco and Johnson grass on Plats 2 and 3, which caused the cotton to be stunted in growth and late in fruiting, producing in the grassy spots practically nothing.



Fig. 2.—Triumph cotton on Plat 2, poisoned beginning early.

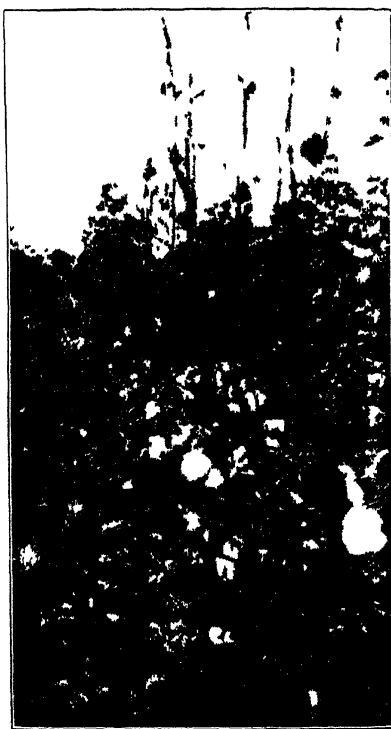


Fig. 3.—Triumph cotton on Plat 4, unpoisoned.

## Field No. 2.—Comparative Test—Early Poisoning On Valley Land

Date of Planting—May 8th.

Areas—Plats 1, 2 and 3, .26 acre each. Plat 4 (check), .29 acre.

Poison Used—Plat 1, commercial preparation; Plat 2, molasses-calcium arsenate; Plat 3, dust calcium arsenate; Plat 4, unpoisoned.

TABLE 4—SUMMARY

## Weevil Infestation

Date of Infestation Record	No. Plants Examined on Each Plat	Weevils per 100 Plants			
		Plat 1	Plat 2	Plat 3	Check
June 21-----	200	1	1	1	½
July 2-----	200	0	0	0	1
	No. Squares Examined on Each Plat	Percent Squares Punctured			
		Plat 1	Plat 2	Plat 3	Check
July 12-----	200	2.0	0.0	5.5	29.5
July 18-----	200	0.0	0.0	0.0	18.5
July 26-----	200	0.0	0.0	0.0	10.0
July 31-----	200	3.0	0.5	5.0	42.0
Aug. 8-----	200	14.0	12.5	13.5	63.5
Aug. 13-----	200	16.5	18.5	20.0	67.5
Aug. 28-----	100	90.0	85.0	90.0	92.0

## Poisoning Record per Acre

Plat No.	Date	Hours Labor	Poison	Cost of Labor	Cost of Poison	Total Cost
Plat 1 Commercial Preparation	June 26---	9.6	9.6 qts.	\$1.68	\$1.85	\$3.53
	July 2---	9.6	5.8 "	1.68	1.12	2.80
	July 12---	6.7	5.8 "	1.17	1.12	2.29
	July 18---	8.6	5.8 "	1.51	1.12	2.63
	Totals--	34.5	27.0 "	\$6.04	\$5.21	\$11.25
Averages--		8.6	6.8 "	\$1.51	\$1.30	\$ 2.81
Plat 2 Molasses Calcium Arsenate	June 26---	9.6	9.6 "	\$1.68	\$ .77	\$ 2.45
	July 2---	9.6	5.8 "	1.68	.46	2.14
	July 12---	6.7	5.8 "	1.17	.46	1.63
	July 18---	8.6	5.8 "	1.51	.46	1.97
	Totals--	34.5	27.0 "	\$6.04	\$2.15	\$ 8.19
Averages--		8.6	6.8 "	\$1.51	\$ .54	\$ 2.05
Plat 3 Dust Calcium Arsenate	June 26---	1.9	9.6 lbs.	\$ .33	\$1.73	\$ 2.06
	July 2---	1.9	7.7 "	.33	1.39	1.72
	July 12---	1.6	7.7 "	.28	1.39	1.67
	July 18---	2.6	5.8 "	.46	1.04	1.50
	Totals--	8.0	30.8 "	\$1.40	\$5.55	\$ 6.95
Averages--		2.0	7.7 "	\$ .35	\$1.39	\$ 1.74

TABLE 4—(Continued)

## Record of Yield per Acre

	Yield Seed Cotton, Lbs.	Gain Seed Cotton, Lbs.	Percent Gain	Value of Increase	Cost of Treat- ment	Profit
Plat 1	1212	495	69.0	\$57.75	\$11.25	\$46.50
Plat 2	1116	399	55.5	46.55	8.19	38.36
Plat 3	1000	283	39.5	32.93	6.95	25.98
Check	717	---				

## Field No. 3.—Early Poisoning—Calcium Arsenate Dust on Hill Land

This field consisted of the hill variety test, and each plat contained the same amount of each variety. It was planted May 7th, and was fertilized and worked in the same manner throughout. One-half of it was poisoned with dust calcium arsenate and the other half left unpoisoned as a check. The check had the advantage over the poisoned plat by being farther from timber.

This field was not watched carefully enough, and one or two varieties had put on some squares before the first application of poison was made on July 2nd. At this time there was found an average of five weevils to 100 plants on each of the plats. An examination of this and other adjoining fields showed this field as a whole to be the highest weevil infested on the Experiment Station.

From Table 5 may be noticed that the first three applications were made at four-day intervals. This was done in an effort to destroy the high weevil infestation which had become established among the squares that had formed before the poisoning was started. Table 5 shows that the infestation was held in check by these frequent heavy applications but that it never was destroyed as in the three plats in Field No. 2, which were started before squares had formed.

Between July 24th and August 1st there was a big jump in the infestation of the check due to the new weevils that had emerged from punctured squares. The infestation of the poisoned plat had not gone very high even by August 13th. One thing that was especially noticeable about this field was the great number of perfect bolls on the poisoned plat and the scarcity of perfect bolls on the check. Table 5 shows in the record of yield that the weevils almost destroyed the cotton on the check and that the poison protected the other plat and allowed it to yield a good crop.

## Field No. 3.—Early Poisoning—Calcium Arsenate Dust on Hill Land

Date of Planting—May 7th.

Area of Each Plat—.42 acre.

TABLE No. 5—SUMMARY  
Infestation Record

Date of Infestation Record—	No. of Plants Examined Each Plat	Weevils per 100 Plants	
		Plat 1, Poisoned	Plat 2, Check
July 2-----	100	5	4
July 6-----	100	0	2
	No. of Squares Examined Each Plat	Percent Squares Punctured	
		Plat 1, Poisoned	Plat 2, Check
July 10-----	200	8.5	33.0
July 16-----	200	1.0	22.0
July 24-----	200	9.0	15.5
Aug. 1-----	200	5.0	74.5
Aug. 6-----	200	8.5	76.5
Aug. 13-----	200	14.5	74.0

Poisoning Record per Acre

Date of Poisoning	Hours Labor	Pounds Poison	Cost of Labor	Cost of Poison	Total Cost
July 2----	2	7.1	\$0.35	\$1.28	\$1.63
July 6----	1.4	7.1	.25	1.28	1.53
July 10----	1.4	8.3	.25	1.50	1.75
July 18----	1.8	4.8	.32	.86	1.18
July 24----	1.8	6.0	.32	1.08	1.40
Totals ----	8.4	33.3	\$1.49	\$6.00	\$7.49
Averages -	1.7	6.7	\$ .30	\$1.20	\$1.50

Yield Record per Acre

Plat No.	Yield Seed Cotton	Gain in Seed Cotton	Percent Gain	Value of Increase	Cost of Treatment	Profits
1. Dust calcium arsenate-----	833	533	177.7	\$62.28	\$7.49	\$54.79
2. Check -----	300	---	---	---	---	---

Field No. 4.—Early Poisoning—Calcium Arsenate Dust on Hill Land.  
(This field was used for new strains of cotton.)

This field was located just west of and adjoining Field No. 3. The hibernation quarters and the soil conditions were practically the same as for Field No. 3, except not quite as fertile.

The first application of dust calcium arsenate was made on Plat 1 on July 2nd, the same day as on Field No. 3. Plat 2 was left unpoisoned as a check. A few squares were just beginning to form at the time of this application. A plant examination showed four weevils to 100 plants in each plat. There was a gradual decrease in the



infestation of the check as the overwintered weevils died off, and then a sudden jump upwards about the first of August as the new weevils emerged from squares and began feeding. The infestation of the poisoned plat remained low after the first application of poison until the last examination on August 13th and was not very high then. It was only 10% then as compared with 70% on the check. Table 6 gives the summary of the records.

#### Field No. 4.—Early Poisoning—Calcium Arsenate Dust on Hill Land

Variety—Twelve strains.

Date of Planting—May 8th.

Area Each Plat—.42 acre.

TABLE 6—SUMMARY

#### Infestation Record

Date of Infestation Record	No. of Plants Examined Each Plat	Weevils per 100 Plants	
		Plat 1, Poisoned	Plat 2, Check
July 2 -----	100	4.0	4.0
Percent Squares Punctured			
		Plat 1, Poisoned	Plat 2, Check
July 10 -----	200	1.0	25.0
July 16 -----	200	2.0	22.5
July 24 -----	200	1.5	3.5
Aug. 1 -----	200	3.0	51.0
Aug. 6 -----	200	14.0	68.5
Aug. 13 -----	200	10.0	70.0

#### Poisoning Record per Acre

Date of Poisoning	Hours Labor	Pounds Poison	Cost of Labor	Cost of Poison	Total Cost
July 2 ---	1.8	8.3	\$ .32	\$1.50	\$1.82
July 10 ---	1.2	8.3	.21	1.50	1.71
July 18 ---	1.8	4.8	.32	.86	1.18
July 24 ---	1.8	6.0	.32	1.08	1.40
Totals ----	6.6	27.4	\$1.17	\$4.94	\$6.11
Averages -	1.6	6.8	\$ .29	\$1.24	\$1.53

#### Record of Yield per Acre

	Yield Seed Cotton	Gain in Seed Cotton	Percent Gain	Value of Increase	Cost of Treatment	Profits
Plat 1 -----	850	179	26.7	\$20.98	\$6.11	\$14.87
Check -----	671	---	---	---	---	---

**Field No. 5.—Early vs. Late Poisoning**

These tests were located on fairly level upland in what is known as the "North Field". This was the only suitable field available for comparing early and late beginning of poisoning. The soil in this field is practically uniform for all the plats used for comparison except Plat 2, which is more fertile than any of the others. The soil is brown clay loam and fairly fertile. It was in cotton during 1922. The whole field was heavily fertilized and cultivated in the same manner throughout. It was planted in Trice cotton on May 21st, securing a good stand, averaging about the same in all of the plats. The hibernation quarters consisted of timber and brush in the pasture and along ditch banks and fence rows on one side and sorghum stubble on the other side, as well as a cabin and barn about 200 yards away.

This field was divided into three plats. Plat 1 was poisoned early just as squares began forming, using dust calcium arsenate. Plat 2 was treated the same way, except beginning a week later. Plat 3 was left unpoisoned as a check.

**Plat 1—*Early Poisoning*:** The growth of the cotton on this plat was watched and the first application of dust calcium arsenate made on July 3rd, just as the first squares were beginning to form. This was about a week after the last weevil emerged from hibernation according to the emergence records on Field No. 1.

**Plat 2—*Late Beginning*:** The first application of dry calcium arsenate was made on July 10th, just a week after the first application on Plat 1. The plants were beginning to fruit well, and an examination showed 30% infestation at that time.

The poison applied on July 16th on Plats 1 and 2 received a heavy rain that afternoon and the next day and was washed off, having practically no effect, so it was repeated on July 19th. In addition to the above poisoning, all plats including the checks received two light applications of poison during August for cotton leaf worms.

The record of yield in Table 7 shows that Plat 1 which was treated before squares formed made a profit of \$9.94 more per acre than Plat 2 (which was started only a week later but after squares had formed), in spite of the fact that Plat 2 was more fertile.

## Field No. 5.—Early vs. Late Poisoning

Variety—Trice.

Date of Planting—May 21st.

Poison Used—Dust calcium arsenate.

Area Each Plat—Plat 1, 0.97 acre; Plat 2, 1.10 acres; Plat 3, 1.24 acres.

TABLE 7.—SUMMARY  
Weevil Infestation

Date of Infestation	No. Plants Examined on Each Plat	Weevils per 100 Plants		
		Plat 1	Plat 2	Plat 3—Check
July 3 -----	300	1.5	1.0	2.2
	No. of Squares Examined on Each Plat	Percentage Squares Punctured		
		Plat 1 Early Poisoning	Plat 2 Late Poisoning	Plat 3—Check
July 9 -----	300	6.0	30.0	34.3
July 16 -----	300	1.0	4.0	22.0
July 24 -----	300	0.0	10.0	21.0
July 31 -----	300	9.0	42.5	51.0
Aug. 7 -----	300	8.0	22.0	34.7
Aug. 13 -----	300	9.5	3.3	43.3
Aug. 27 -----	100	78.0	83.0	92.7

## Poisoning Record per Acre

Plat No.	Date of Treatment	Labor Hours	Poison Pounds	Cost of Labor	Cost of Poison	Total Cost
Plat 1 Early Beginning	July 3 ---	1.3	6.0	\$ .23	\$1.08	\$1.31
	July 9 ---	1.3	6.0	.23	1.08	1.31
	July 16 ---	1.4	4.3	.25	.77	1.02
	July 19 ---	0.8	5.7	.14	1.03	1.17
	Totals ----	4.8	22.0	\$ .85	\$3.96	\$4.81
Averages --		1.2	5.5	\$ .21	\$ .99	\$1.20
Plat 2 Late Beginning	July 10 ---	1.4	5.9	\$ .25	\$1.06	\$1.31
	July 16 ---	1.4	4.3	.25	.77	1.02
	July 19 ---	0.8	5.7	.14	1.03	1.17
	Aug. 1 ---	1.8	6.4	.32	1.15	1.47
	Totals ----	5.4	22.3	\$ .96	\$4.01	\$4.97
Averages --		1.3	5.6	\$ .24	\$1.00	\$1.24

## Record of Yield per Acre

Plat No.	Yield Seed Cotton	Gain Seed Cotton	Percent Gain	Value of Increase	Cost of Treatment	Profit
Plat 1—Early poison	1209	553	41.2	\$41.28	\$4.81	\$36.47
Plat 2—Late poison.	1126	270	31.5	31.50	4.97	26.53
Plat 3—Check -----	856	---	---	----	----	----

### Conclusions and Recommendations

The method of early poisoning used in the experiments described in this paper seems very promising, but it should be regarded as still in the experimental stage. The theory is good, and if future tests should demonstrate its value conclusively, it will probably become one of the most popular control measures for the weevil. The fact that equally good results were obtained with the molasses mixtures and the calcium arsenate dust is a good point. Where labor is cheap and the acreage is small, the liquid poison may be preferred, but in most cases the calcium arsenate dust will be cheaper, as considerable labor is necessary in applying the liquid poisons.

If a farmer is using this method of poisoning he should watch his fields very closely during July and August and be prepared to make a dust application of calcium arsenate if 10% of his squares become infested, resulting from the general movement of weevils, improper early poisoning, or continued emergence of weevils after poisoning. Such an infestation is especially likely to occur if his fields are surrounded by the unpoisoned cotton of his neighbors. However, if the two early applications of poison were properly made at the right time on all cotton in any community each season, it is believed that the weevils would be kept under control. Any method of fighting the weevil will be most effective if practiced on a community basis.

With this method, as with any other, it should be remembered that poison acts only as a protective agent, and that only by using the best farming methods on lands of high fertility can large yields be secured, even with perfect weevil control. The advice of the nearest experiment station should be followed closely in regard to crop rotation, soil preparation, fertilization, varieties, planting, spacing, and cultivation.

## DISEASES OF SORGHUM AND SUGARCANE

*(By L. E. Miles and D. C. Neal)*

Sorghum and sugarcane are two crops which have been but little troubled by fungous diseases in the past. However, there are a number of troubles, which, if allowed to obtain a foothold, may become widely prevalent and cause a serious loss to the grower. The most important of these are already present in Mississippi in greater or less degree and are described below:

### Grain Smut of Sorghum

This smut is found only in the individual grains of the sorghum head or panicle, which become, in consequence of the attack, considerably elongated and usually somewhat increased in diameter. The elongated grains, whose membranous covering is quite white upon

its first appearance, are very conspicuous, as illustrated in Figure 4. Upon maturity of the cane, the smutted grains are of a grayish color, and the membrane more or less broken when exposed all winter. Most, if not all, the kernels of a smutted head are usually destroyed.

The causative organism is *Sphacelotheca sorghi* (Link) Clinton. The life history is well known. It is similar to that of stinking smut, or bunt, of wheat, in that the spores, or smut dust, gets on the grain or kernels in thrashing or handling, and when the seed is planted they grow at the same time that the seed sprouts. The smut plant penetrates the stalk of the young seedling plant and grows inside the latter until the heads are formed, when the fungus forms its spores inside the grains, replacing the latter.

The chief danger from this smut, as well as from the one next mentioned, the head smut, is the probability of their rapid spread if proper precautions are not taken to keep them in check. The loss at present is probably not as great as that sustained by wheat and oats from similar smuts, but it is nevertheless quite considerable. It is therefore very important that any farmer who is not sure that his



Figure 4.—Grain Smut of Sorghum. Note enlarged, smutty grain scattered throughout the fruiting heads. (Photographed by J. M. Beal, Botanical Dept., A. & M. College, Miss.)

seed is free from smut should treat it in one of the ways suggested below. When his seed is once clean he can keep his farm free from the disease by raising his own seed, provided he does not allow it to become smutted again in a smutty thrashing machine or in the subsequent handling of the grain.

*Treatment.*—Smutty seed may be treated in the following ways:

*Formaldehyde Treatment.*—Mix one pound of 40% formaldehyde with thirty gallons of water. Put the seed in sacks and immerse in this solution for one hour, stirring occasionally. Take the sacks out and allow them to drain. Spread the seed out on a clean floor or canvas. Be sure that the floor or canvas, and everything used in handling the grain after treatment is thoroughly cleaned either with hot water or a strong formalin solution. The seed will be infected again if any untreated smut spores touch it. When sufficiently dry after treatment, the seed may be sown.

The same solution may be used as a spray, in which case the seed to be treated should be spread on a clean floor or canvas and sprinkled with the solution. Shovel over thoroughly until all the seeds are wet. It should then be shoveled into a pile and left over night, covered with clean canvas or sacking to keep in the fumes, and then spread out to dry in the morning.

*Hot Water Treatment.*—Heat two large vats or tubs of water to about 135° and 140° F., respectively. Place the seed to be treated in a clean sack or wire basket and plunge in the tub of water heated to 135° F. for a moment. Then transfer the sack or basket to the second tub or vat for ten to twelve minutes. Keep the temperature of the water in the second tub between 134° and 140° F. It should not be allowed to go above 142° or below 134° F. The seed should be frequently stirred to keep the temperature uniform throughout. Small sacks should be used, since in large sacks it is impossible to keep the temperature constant. After treatment the seed should be spread out to dry on a clean floor or canvas. When sufficiently dry it may be sown.

### Head Smut of Sorghum

This smut, caused by the organism *Sphacelotheca reiliana* (Kuhn) Clinton, is very different in appearance from the grain smut. The whole head, just as it emerges from the upper leaf, is converted into a single large smut mass, covered by a whitish or grayish membrane, which soon bursts and sets the spores of the fungus free. All trace of the individual grains, or kernels, is lost. The spore mass is black and powdery in appearance, and, since the protecting membrane soon disappears, and the spores are dispersed, all that remains in a short time is a mass of black threads which represent the remnants of the fibrovascular bundles and the panicle branches.

Seed treatment does not control this disease because the main infections do not come from seed-borne spores. No other satisfactory

control measures have been developed. The collection and destruction of diseased heads previous to the liberation of the spores is recommended as a means of prevention from infection the following season. This disease attacks corn also, though it is more severe on the sorghum. Sorghum, therefore, should not precede, or follow corn if the trouble is severe on either of the crops.

### Sorghum Blight

This is a bacterial disease of sorghum plants caused by *Bacillus sorghi* Burrill. It appears on the leaves as reddish spots which are usually elongated to narrow lines. Later they increase to large irregular spots and may then destroy the leaves entirely. Both the sheath and blades of the leaves are affected, as shown in Figure 5. The roots are also attacked and it is possible that the bacterium lives over unfavorable seasons in the soil. The organism is usually not found in the stem except in wounded portions.

Land upon which diseased plants have been grown should not be sown to sorghum for a year or two. All diseased plants should be destroyed.

### Sorghum Rusts

Two rusts of sorghum due to *Puccinia sorghi* and *Puccinia purpurea*, respectively, occur on the blades of the leaves, but not in sufficient amounts ordinarily to cause any serious loss or to necessitate treatment of preventive measures.

### Mosaic Disease of Sugarcane

This trouble is due, according to the most generally accepted theories, to some ultramicroscopic organism. At present it seems to be the disease most likely to become of the greatest importance to the sugar growers of this country. It is present in Louisiana, Florida, Georgia, Alabama, Mississippi, and probably Texas. In Louisiana, as is to be expected from the very large amount of cane grown there, it has become very firmly established and has become already a problem of the very greatest economic importance. In Mississippi it has been found rather widely distributed in the southern part of the state, and a more extensive survey will probably show it to be present in a number of other counties.

The disease has been known in this country for a very short time only and data on the losses which it is apt to cause here are therefore meagre. Some statistics from the Louisiana Sugar Experiment Station at Audubon Park, Louisiana, however, tend to show that we may expect losses almost equal to those occasioned by the disease in Porto Rico, if it is allowed to become as widespread here as it is in that country, though losses here are held in check somewhat on account of frequent replanting. On that island, as well as in Hawaii, Egypt, Java, and other places where the disease occurs the decrease in the

amount of sugar produced ranges from five to forty per cent, and a few instances of even larger reductions in yield have been reported.

The disease first becomes apparent on the younger leaves of the infected plants. Upon walking between the rows of cane in an infected field, some plants will be seen which are conspicuous on account of a general pallor of the leaves. Closer examination reveals that the



Figure 5.—Sorghum Blight. A leaf showing the brownish, red spots caused by *Bacillus sorghi*. Some anthracnose blight is also present.

pallor is due to irregular light-colored spots, or streaks on the leaves. Figure 6. The most common type of spotting presents merely a "washed-out" appearance, being merely a tint of the normal color. In the second type affected spots have a decided yellowish green appearance. The normal and affected areas are sharply demarked. There



is no gradual merging of one color into the other. There is very great diversity of patterns in the different varieties of cane, due to the amount, size and shape of the light-colored areas, but the arrangement is quite constant in any one variety.

The effects of the disease appear to be cumulative. The streaking and spotting of the leaves described above are the only noticeable signs on newly-infected plants. In one variety grown in Louisiana, L511, it soon becomes apparent on the stalks also in the form of red streaks. The disease is never fatal during the first year, and, in fact rarely terminates in death, even in diseased plants that have been allowed to ratoon for years. Usually, however, more serious effects are seen on cane rising from diseased seed, or on the first ratoons from cane infected the previous year. A new type of leaf spot, consisting of small, irregular, white, opaque spots and streaks in the light colored areas then appear. At this time, or later, a striping or cankering

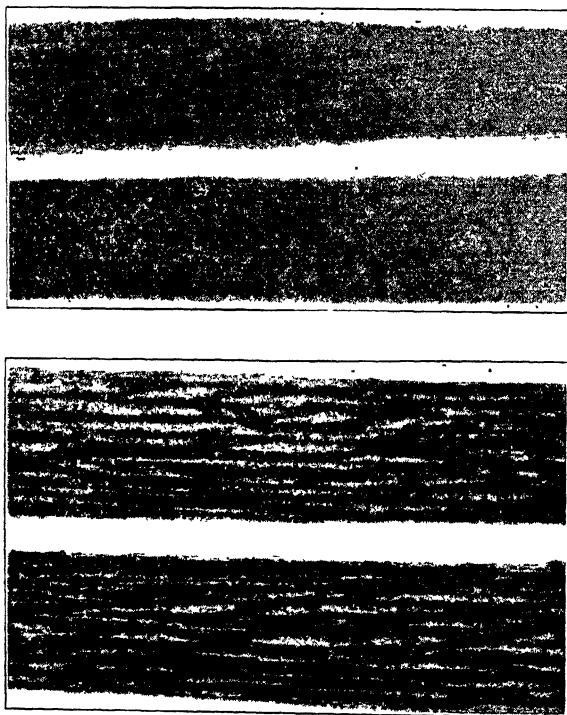


Figure 6.—Mosaic Disease on Sugar Cane Leaves. (Top) Leaf from a healthy plant. (Bottom) Leaf from a plant infected by the Mosaic Disease. Note the irregular streaks of pallid green and chlorotic effect.

of the stalk sometimes occurs. This is not common in this country, due to the frequent replanting. The stunting in growth, also tends to become much more prominent on ratoons from diseased cane and on cane grown from diseased seed.

The disease is infectious and is transmitted by sucking insects and by diseased seed. It is known to occur on a number of other members of the grass family, for instance, corn, sorghum, rice, millet, crab-grass, fox-tail, and *Panicum*. Observations, however, tend to show that these other hosts of the disease become infected only under very favorable conditions and when in close proximity to diseased cane.

As control measures, elimination by the use of clean seed on land which has not grown sugarcane is recommended. Where the amount of infection in a field is small, for instance ten percent in young cane, or five percent in mature cane, the disease may be eradicated by roguing. This consists in going through the field, row by row, and pulling out all infected canes. They may then be thrown down between the rows, since, as soon as they wilt there is no further danger from them. The incubation period of the disease is about seventeen days, that is, it is that long after the plant becomes infected before the disease becomes apparent. It is therefore necessary to repeat the process at intervals of about two weeks, in order to remove any new infections which may have been in the incubation stage at the previous roguing. When this has been done until no new infections are found, the field may be considered free from the trouble. If the transmitting insects are active, however, it may result only in a control of the trouble and not its complete eradication.

In fields where the disease is more abundant the recommendations are to mill the cane for syrup at the regular time and then to plow up and destroy all stubble. New seed should be obtained which is known to be free of the disease and it should be planted on land which has not grown sugar cane for a period of two years or more. The land on which the diseased cane was grown should not be planted to cane or any other grain crop for two years or more. All bagasse and refuse should be destroyed by burning.

### Red Rot of Sugar Cane

Red Rot of Sugarcane occurs widely in most of the sugar producing regions of the tropics, and is also present in Mississippi, Louisiana, Georgia, and Florida. Specimens have been received the past season from two counties in the state, viz., Stone and Harrison. This disease is caused by a fungus known as *Colletotrichum falcatum* Wenk. It attacks both the stalks and the leaves of the sugarcane plant. In case the disease is confined to the stalk, its recognition is difficult because it is altogether internal. A stalk may look perfectly healthy on the outside, but when cut open it may be found to be badly diseased. Red Rot, as the name indicates, is characterized by a bright red discoloration of the inside tissue of the stalk. As a rule, the red color of



Figure 7.—Photograph of two pieces of cane showing very characteristic symptoms of Red Rot (*Colletotrichum falcatum*). It will be noticed that the central tissues alone are affected, the outer, harder tissues being free from any discoloration. The right hand piece shows—at x.x.x.—the characteristic white spots in the middle of the red blotches. Infection probably took place through borer wounds, though these are not to be seen in the specimens shown. (After L. Lewton-Brain, Hawaiian Sugar Planters' Asso-

the affected tissues is not equally distributed. It usually extends out from the nodal regions in streaks, or bands, in some places being dark red and in others a lighter shade. Almost invariably well defined white spots at areas can be observed entirely surrounded by red tissue. Figure 7. This feature is characteristic of this disease only.

Leaf infections also occur usually on the midrib. Here the disease first manifests itself as a small red spot on the upper side. Such spots develop rapidly in both directions along the midrib of the leaf and frequently attain a length of one to two feet. Edgerton<sup>1</sup> states that leaf infections are very helpful in diagnosing the disease. Poor germination, poor stands, and unhealthy plants usually result when cane is planted that is infected with Red Rot. The sugar content in cane, especially the sucrose, is also very much decreased in cane infected by the fungus.

*Control of Red Rot.*—In view of the fact that Red Rot of sugarcane has been reported in the state, farmers should be on the alert in regard to control measures for the disease. First, all diseased cane should be destroyed; second, the cane to be used for planting should be selected as carefully as possible, avoiding not only stalks infected with the disease, but also borer cane. The latter has been shown to serve as an entrance or source of infection for Red Rot, and any stalks showing borer channels should also be discarded. In selecting seed cane for planting, it is of course obvious that where a large acreage is involved all the cane cannot be selected. However, many growers in Louisiana and in Georgia make a practice of carefully selecting enough seed to plant a few acres and from such a plot they obtain a sufficient quantity of seed to plant the desired acreage the following year. A selected plot of cane each year would no doubt tend to decrease both disease and insect attacks very materially.

### The Pineapple Disease

The Pineapple Disease is another serious disease of sugarcane, being widely prevalent in all the tropical sugarcane growing countries. This disease has been reported the past season from one county in south Mississippi, and also in previous years from certain sections of Louisiana. The disease is caused by a fungus, known as *Thielaviopsis ethacetica*. The fungus grows quite rapidly and produces spores in abundance. The disease appears to gain entrance into the stalks of cane only through wounds in the rind or at the cut ends of the stalk. After gaining entrance, however, the fungus spreads rapidly and frequently the cane tissue and eyes are destroyed.

Like the Red Rot previously discussed, the Pineapple Disease does not usually show on the outside of the stalk. From the exterior the stalk may appear perfectly sound, but when split open it may be badly

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<sup>1</sup>Edgerton, C. W., Louisiana Experiment Station, Bulletin 120, March 26, 1910.

diseased. If the disease has progressed to any extent, the center of the stalk will be more or less decomposed, forming a central cylinder or "pipe" as it is called. This cylinder may extend through several internodes and is almost black in color. Another characteristic of the disease is the odor produced by the infected stalks. They are said to give off an odor very much like that of ripe pineapples, hence the name pineapple disease.

*Control.*—The fungus causing Pineapple Disease is able to gain entrance into the stalks only through the wounds or at the cut ends. Because of this fact, treating the seed cane before planting with a fungicide to exclude the organisms is sometimes practiced. Especially is this true in the principal sugar growing countries of the tropics. Here planters find that dipping the seed cane in a solution of Bordeaux mixture reduces infection of the Pineapple Disease and is also quite practicable.

At present the disease does not occur in sufficient amounts in this state to resort to seed treatment, but farmers should be on the lookout for the disease, and they should guard against introducing new varieties of seed cane on their farms from distant localities or from regions where the Pineapple Disease and other maladies of sugarcane are known to occur.

### The Rind Disease

The Rind Disease, caused by the fungus *Melanconium sacchari*, so far as known, does not occur in Mississippi. It is a very important disease of sugarcane in the tropical regions, and has also been reported from Louisiana. According to Edgerton<sup>1</sup> seed cane that is affected with the Rind Disease generally has an abundance of black fruiting pustules on the surface. The interior of the cane stalk is variously colored; and red, yellow, brown and greenish colors have been observed. The tissue dries out rapidly so that the whole cane shrivels and becomes light in weight. The eyes of the cane are killed by the fungus and the germination is materially impaired.

*Control.*—The Rind Disease, as in the case of the Pineapple Disease, enters the stalk only through wounds, borer holes or the cut ends; and because infection takes place in this manner, treatment of the seed cane before planting as recommended for the Pineapple Disease also applies here. In addition, especially if the disease should become serious, all old diseased material in the fields should be destroyed in some manner every fall. Such material harbors the spores of the fungus and exposes the planted cane to the disease.

### Root Rot Disease

Root Rot of sugarcane was found in the fall of 1922 in three separate counties in Mississippi. Traces of the disease were observed in

<sup>1</sup>Edgerton, C. W., Louisiana Experiment Station, Bulletin 120, March 28, 1910.

Pearl River and Lauderdale counties and in Webster county a very heavy infection was observed. This field consisted of about five acres and fully twenty-five percent of the stalks were infected. The disease is caused by one of the higher fungi, one of the mushrooms, known to pathologists as *Marasmius plicatus*. On the growing cane, it kills the roots and grows in between the lower leaf sheaths. The leaf sheaths are not shed as is the case with healthy cane, but remain glued together around the stalk. Usually during late summer, if the weather conditions are suitable, the little mushrooms, the fruiting part of the fungus, develop on the leaf sheaths. Figure 8.

In addition to destroying the roots of the growing cane, the fungus frequently enters the cut ends of seed stalks and grows through them, entirely destroying the eyes before germination. Where stalks become infected after attaining considerable size, a number of leaf sheaths may become firmly cemented about a portion of the stalk and seriously obstruct the proper growth of the eyes and roots from the nodes involved.



Figure 8.—Root Rot of Sugar Cane caused by the fungus *Marasmius plicatus*. Note the decayed roots, and the fungus and fruiting bodies on the lower leaf sheaths. (Photographed by C. W. Edgerston, Louisiana Experiment Station.)

*Preventive Measures.*—In combating Root Rot one must rely on preventive rather than remedial measures of control. Briefly summarized, these should include timely and thorough cultivation, the destruction of infective refuse, crop rotation, and the use of healthy

seed cane. Thorough cultivation, together with good soil drainage are important in combating Root Rot Disease since these factors promote and maintain the vigor and resistance of the plant during its period of early growth, a time when they are apt to be attacked by the root-rot fungus if its environmental conditions are unfavorable.

Since the fungus causing root rot lives over from season to season in the dead and decaying parts of affected canes that are left in the field, it becomes necessary to thoroughly clear infected fields of such debris. Burning over fields destroys much of the infected trash, and this, coupled with the destruction of all old cane stumps, will hold the disease in check. In cases where root rot is fairly generally established in a field it is well to abandon the stubble crop entirely, and make plans at once for new ground on which to plant healthy cane.



# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

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Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

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Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

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## BOLL WEEVIL CONTROL INVESTIGATIONS IN MISSISSIPPI

Many people have the erroneous idea that the State of Mississippi has spent large sums of money investigating control measures for use against the boll weevil. As a matter of fact, the Legislature has never appropriated any money for boll weevil investigations. In fact, the Entomology Department of the Experiment Station has never received one cent of support from the State for the investigation of the boll weevil or any other insect pest. It is to be hoped that the Legislature of 1924 will make proper provision for entomological work by the Experiment Station so that the Station will have funds for studying the boll weevil and other insect pests in Mississippi.

Realizing the urgent need for boll weevil control studies in Mississippi, and having a group of employees trained along entomological lines, the Plant Board felt that this additional service to the State should be rendered to as large extent as possible. Consequently all



Plant Board workers throughout the State were instructed to do just as much boll weevil control work during 1923 as they could without interfering with their various other duties. As a result, some of this work was done at a number of places in the State, including Meridian, Hattiesburg, McComb, Tupelo, Grenada, Poplarville, Raymond, Stoneville, Holly Springs and A. & M. College. The most extensive of these tests, however, were conducted on the Holly Springs Branch Experiment Station by Mr. T. F. McGehee, who reports some of his work in this issue of the Bulletin.

It must be strongly emphasized that the method described is still in the experimental stage, and that more work extending over a period of several years must be done before it can be unqualifiedly recommended. Moreover, it should not be hastily adopted by anyone as a substitute for any well-established satisfactory method of control. While it is very desirable that a large number of farmers in all parts of the State should try this method in an experimental way during 1924, any cotton grower would certainly be unwise to risk his entire crop on this method, especially if he had already been using another method of control with satisfactory results. Even if it should prove to be the best method for small farms or for certain conditions, it is quite probable that it will not supplant methods that are already successful over large areas. A great deal more experimentation with boll weevil control should be done in Mississippi, and it is hoped that the next Legislature will provide ample funds for the Experiment Station to carry on this work.

### NEW BULLETIN ON SATSUMAS

One of the most interesting and valuable bulletins received at the State Plant Board office in some time is Mississippi Experiment Station Bulletin No. 217, "The Satsuma Orange in South Mississippi", by Prof. E. B. Ferris, director of the South Mississippi Branch Station at Poplarville, and Mr. F. B. Richardson, former horticulturist of that station. The bulletin gives a detailed history of the citrus experiments in Mississippi, followed by a thorough discussion of the problems confronting those engaged in this rapidly-growing industry, including such topics as selection of a location for a grove, planting, cultivating, fertilizing, spraying, propagating, harvesting, marketing, yields, costs, profits, etc.

Any farmer in South Mississippi who is growing Satsumas, or expecting to grow them, should write at once to Prof. J. R. Ricks, Director of the Agricultural Experiment Station, A. & M. College, Mississippi, for a copy of this excellent bulletin.

## QUARANTINE INSPECTION REPORT

For Period from July 1 to September 30, 1923

(By Geo. F. Arnold, Quarantine Inspector)

## Ships and Vessels Inspected:

From foreign ports .....	7
From U. S. ports .....	0
Total.....	7

## Parcels Inspected:

Arriving by water—None.

Arriving by land, express, freight, wagon, etc.:

Passed .....	37
Treated and passed .....	0
Returned to shipper .....	0
Contraband destroyed .....	0
Total.....	37

## Arriving by mail:

Passed .....	137½
Treated and passed .....	10
Returned to shipper .....	2½
Contraband destroyed .....	8
Total.....	153

Grand total of parcels inspected ..... 190

Number of parcels on hand September 30, 1923, pending  
determination as to final disposition.....

Total parcels passed -----	174½
Total parcels treated and passed -----	10
Total parcels returned to shipper -----	2½
Contraband destroyed -----	8

Grand total..... 190

## APIARY INSPECTION REPORT

For Period July 1-September 30.

<i>County—</i>	<i>Frame Hives</i>	<i>Box Hives</i>	<i>Number Colonies American Foulbrood</i>	<i>Number Colonies European Foulbrood</i>
Adams -----	504	--	--	--
Alcorn -----	139	25	--	--
Bolivar -----	455	55	2	6
Chickasaw -----	68	--	--	--
Harrison -----	11	1	--	--
Itawamba -----	--	7	--	--
Jackson -----	76	17	--	--
Jefferson -----	108	3	--	--
Lee -----	169	296	--	--
Monroe -----	20	13	--	--
Noxubee -----	457	40	--	--
Pearl River -----	5	41	--	--
Pontotoc -----	--	69	--	--
Prentiss -----	58	54	--	--
Sunflower -----	9	45	--	--
Tishomingo -----	1	12	--	--
Union -----	46	--	--	--
Washington -----	1105	19	40	23
Wayne -----	6	7	--	5
Wilkinson -----	6	--	--	--
Total -----	3243	704	42	34

In many cases the inspections noted above were made while an inspector happened to be in a county on nursery inspection work, sweet potato inspection, or other Plant Board business, hence the amount shown for some of the counties is very small. So much rain during the quarter, and a lack of inspectors for this work, prevented as much being accomplished as was desired.

## REPORT OF NURSERY INSPECTOR

For Period July 1 to September 30, 1923

During this period thirty-three certificates were issued to agents or salesmen as required by Rule 34-B of the Plant Board.

Number of nurseries inspected .....	127
Acreage in nurseries inspected .....	690½

*Amount of Nursery Stock Inspected*

Grafted and budded pecans .....	217,570
Seedling pecans .....	588,500
Total pecans .....	806,070

Citrus trifoliata .....	879,780
Orange .....	126,405
Grapefruit .....	2,405
Miscellaneous citrus .....	2,250
Total citrus .....	1,010,840

Apple .....	7,200
Pear .....	118,925
Peach .....	20,975
Japanese Persimmon .....	5,350
Grape .....	8,250
Fig .....	5,850
Strawberry .....	870,750
Mulberry .....	90
Miscellaneous Fruit .....	4,143

Total fruit stock (Citrus excluded) .....	1,041,533
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Rose .....	211,943
Other Ornamentals .....	1,080,314

Total ornamental stock .....	1,302,257
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Grand total of plants inspected during period .....	4,160,700
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## CITRUS CANKER SCOUTING REPORT

For the Period July 1, 1923, to September 30, 1923.

Number of counties in the state which have at one time or another since 1916 shown canker .....	4
Number of counties showing canker July 1, 1923 to September 30, 1923 .....	0
Number of grove trees inspected July 1, 1923 to September 30, 1923 .....	24,326
Number of nursery trees inspected July 1, 1923 to September 30, 1923 .....	61,896
Number of <i>C. trifoliata</i> inspected July 1, 1923 to September 30, 1923 .....	98,101
Total number of grove trees found infected June 1, 1916 to September 30, 1923 .....	3,117
Total number of nursery trees found infected June 1, 1916, to September 30, 1923 .....	51,167
Number of properties infected during 1917.....	47
Number of properties infected during 1918.....	14
Number of properties infected during 1919.....	4
Number of properties infected during 1920.....	0
Number of properties infected during 1921.....	1
Number of properties infected during 1922.....	8
Number of new properties infected during 1917.....	12
Number of new properties infected during 1918.....	1
Number of new properties infected during 1919-1920.....	0
Number of new properties infected during 1921.....	1
Number of new properties infected during 1922.....	8
Number of new properties infected during 1923.....	0
Total number of properties found infected June 1, 1916 to September 30, 1923 .....	130
Total number of properties declared no longer danger centers..	124

THE QUARTERLY BULLETIN  
— OF THE —  
STATE PLANT BOARD  
OF MISSISSIPPI

VOL. 3

JANUARY, 1924

No. 4

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 8, 1900.

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# Safeguarding the Entry of Freight Cars from Mexico to Prevent the Entry of the Pink Bollworm

(E. R. Sasser \*)

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The existence of the Pink Bollworm in Mexico was determined by the Bureau of Entomology on November 1, 1916, as the result of the receipt of infested bolls from the Laguna District. Realizing the necessity for prompt action, the Federal Horticultural Board took this situation under advisement; and on November 4, 1916, Amendment No. 1, dated August 18, 1913 and Amendment No. 2, dated June 17, 1914 to Notice of Quarantine No. 8 of May 28, 1913, which amendments permitted the importation of cotton seed (including seed cotton) and cotton seed hulls from the states of Nuevo Leon, Tamaulipas, Coahuila, Durango, and Chihuahua, Mexico for manufacturing purposes, were revoked.

An emergency appropriation was made available on March 4, 1917, and immediate steps were taken to organize a Border Control which was placed under the field charge of Mr. T. C. Barber, with headquarters at San Antonio, Texas. Inspectors were assigned as follows: Brownsville, Texas—one; Laredo, Texas—two; Eagle Pass, Texas—two; and El Paso, Texas—two.

It was soon evident that cars which had served as carriers of cotton and cotton seed in the interior of Mexico were arriving at the Border fouled with cotton seed, some of which was infested with the Pink Bollworm. To meet this situation, "Rules and Regulations Prohibiting the Movement of Cotton and Cotton Seed from Mexico into the United States and Governing the Entry into the United States of Railway Cars and other Vehicles, Freight, Express, Baggage, or other Materials from Mexico at Border Points" were issued July 21, 1917. These regulations did not apply to railway cars or other carriers originating in or shipped directly from the states of Sonora and Lower California, Mexico. Information as to the possible occurrence of the Pink Bollworm on the West Coast of Mexico made it necessary to subsequently include the state of Sonora, and the regulations were so amended January 29, 1920.

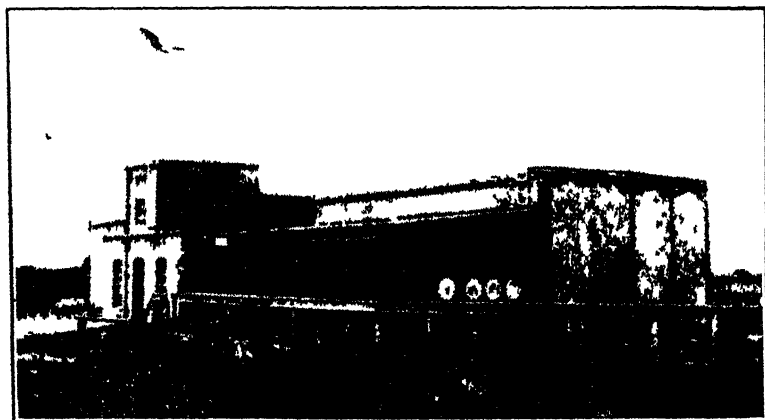
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\*Entomologist in Charge, Plant Quarantine Inspection Service, Federal Horticultural Board.



Realizing the impossibility of detecting every cotton seed which might be concealed in a car, experiments were conducted in the fall of 1917 to determine the effectiveness of Hydrocyanic Acid Gas, under normal atmospheric conditions, on the Pink Bollworm. These tests were conducted in Washington, in rooms and freight cars. Larvæ of the Pink Bollworm were put in single, double, and triple pill boxes, and these boxes were placed in various parts of the rooms and freight cars to determine the effectiveness of the gas at different heights. The results of these experiments indicated that the larvæ of the Pink Bollworm could be satisfactorily killed at temperatures which usually prevail on the Mexican border, using two ounces of sodium cyanid per hundred cubic feet of space, at any point in the room or car, provided the insect was not in seed in bulk.

Approximately one-third of all the cars inspected were found to contain cotton seed, and in many instances, living larvæ of the Pink Bollworm were found in seed taken from such cars. Inasmuch as the entry of cotton seed from Mexico, other than Sonora and Lower California, was prohibited, any cotton seed found represented remnants of carload lots which had been carried from place to place in Mexico.



(Fig. 1)

Six-Car Fumigation House at Brownsville, Texas.

It was learned that at certain points on the Border, representatives of the State Board of Health of Texas, for sanitary reasons, were fumigating the interiors of freight cars with Hydrocyanic Acid Gas. In the light of the evidence secured as a result of the experimental work conducted in Washington, arrangements were made with the local health officers to fumigate all freight cars requiring such treatment on account of the possibility of infested seeds being concealed in cracks and crevices of the cars. It was possible to fumigate the interiors of

box cars only, as the use of gas was impracticable for flat, gondola, tank cars, etc. All cars which could not be fumigated were sprayed with kerosene.

The system of fumigating cars and freight with Hydrocyanic Acid Gas by means of generators placed within the cars was found to be unsatisfactory, owing to the poor condition of the cars and also to the fact that it gave no security against any insects which might be resting on the exterior of the cars. To meet these deficiencies, it seemed desirable to provide for the fumigation of cars and freight in houses specially constructed for the purpose. The authority to construct such houses was granted by Congress toward the end of the fiscal year 1918, and plans were drawn, bids secured, and contracts let for the construction of five fumigation houses as follows: Laredo, Texas—capacity, 15 cars; Eagle Pass—8 cars; Brownsville—6 cars (Fig. 1); and El Paso—1 car; and a small shed at Del Rio (Fig. 2) to accommodate wagons, trucks, automobiles, etc. The Texas Border Service was then under the direction of Professor R. Kent Beattie (who succeeded Mr. T. C. Barber), and it was largely through his untiring efforts that the first five houses on the Border were constructed. These houses were



(Fig. 2)

Small Units used for the Fumigation of Wagons, Automobiles, Etc., Found to be Contaminated with Cotton Seed. Small Room to Extreme Left Used As an Office.

completed in the late summer of 1919; and about that time, Professor Beattie was placed in charge of the Office of Foreign Plant Quarantines of the Federal Horticultural Board, and the Border Service was combined with the Plant Quarantine Inspection Service under the supervision of the writer. The houses were put into operation on October 1, 1919, and 7,772 cars were fumigated during the remainder of that fiscal year.

The Congress in appropriating funds for the purchase of chemicals and labor incident to the proper fumigation of cars crossing the Bor-

der, made the proviso that "Any monies received in payment for charges fixed by the Secretary of Agriculture on account of such cleaning and disinfection at plants constructed therefor out of any appropriation made on account of the Pink Bollworm of cotton to be covered into the Treasury as Miscellaneous Receipts". Inasmuch as the fee for fumigating the interior of a car at the time the work was performed by the Texas State officials was \$5.00, a similar charge was made by the Board. It was soon evident that the charge was excessive, and on February 1, 1920, it was reduced to \$4.00. A fee of 50 cents is collected for each buggy, wagon, or automobile fumigated at Del Rio, Texas.

It was soon obvious that the one car house at El Paso was inadequate for the purpose intended, and the construction of a fifteen-car fumigation house (Fig. 3) at that port was begun in June of 1920. On January 20, 1920, an inspector was placed at Nogales, Arizona, in connection with the extension of the Border traffic regulations to the state of Sonora and a fourteen-car fumigation house was completed at that port in the late summer of 1921.

As a result of a fire which originated on the premises of a local oil company, the fifteen-car fumigation house at Laredo, Texas, was destroyed on July 19, 1922. In view of the fact that the capacity of the fifteen-car house was frequently taxed, that house was replaced by a twenty-car house which was put into operation on May 4, 1923.

The total cost of constructing the eight fumigation houses on the Border, including generators, necessary equipment, and miscellaneous supplies, other than the chemicals used in generating the gas, amounts to \$166,403.46.

### Inspection of Cars

The inspection of railway cars, other than Pullman cars, from Mexico, is performed in the Mexican port opposite the American port of entry. This procedure is necessary, since once a car has crossed the international boundary, it is supposed to have legally entered the United States. In inaugurating this system of handling cars, naturally many annoying situations arose. The difficulties which confronted the inspectors are well described by Mr. O. D. Deputy, Chief Inspector, Border Inspection, who arrived on the Border shortly after the service was begun<sup>(1)</sup>:

"The initiation of this mode of inspection was an onerous task, indeed, and many a wrench was thrown into the machinery of inspection by uninformed Mexicans who could not understand why the entry into the States of a few stray cotton seed in the cracks of railway cars should be objected to; nor could they see by what manner of logic we could presume to make such inspections in Mexico. So presumptuous did the

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(1) Jr. Ec. Ent., Vol. XIV, No. 2, pp. 178-183 (1921).

men performing the work appear to them and so odious the requirements of the regulations that they straightway gave the men engaged in the same the name 'Picudo', meaning in Spanish according to their application, 'long nosed, nosey individual'. Nor was this the only indication of a lack of co-operation for the American shippers were of the mind at first that the inspection was too exacting and that the regulations were too stringent. Finally, however, by diligently explaining the need for the inspections and by fair treatment of each case according to its merits, the inspectors caused the work to gradually gain in favor, until now it is indulgently tolerated if not particularly sought after."

All American freight, gondola, tank cars, etc., which upon inspection are found to be apparently free from cotton seed are certified for entry into the United States. Certification is refused of all cars found to be fouled with cotton seed until they have been thoroughly cleaned to the satisfaction of the representative of the Board. A record is



(Fig. 3)

Fifteen-car Fumigation House at El Paso, Texas. Some idea of the length of this house can be gained by comparing it with the height.

made of every car that is certified for entry, giving the following facts: Mexican shipping point, car number and initials, cargo, date inspected, whether or not it contained cotton seed, if so, date transfer was made, whether or not routed through infested district in Mexico and through American cotton belt, U. S. destination, date of arrival at Mexican port, shipper, consignee, date certified for entry, whether or not fumigated, and when released. Cards bearing this information are made out in duplicate, one copy being filed at the port of entry and the other in the central files in Washington. For the convenience of the port inspectors, the cards retained on the Mexican Border are filed by car number, but those forwarded to Washington, according to cargo. Incidentally, these records furnish accurate information on the type of material exported from Mexico into the United States.

All Pullman cars are examined on the American side in co-operation with the Customs and Immigration officials.

### Fumigation of Cars

As a last line of defense, all cars requiring fumigation are immediately upon their arrival in the United States, fumigated in the houses previously referred to. Prior to taking over the fumigation of cars, preliminary experiments were conducted in the houses at Laredo, Eagle Pass, El Paso, and Del Rio (which are practically air-tight) to determine the exact dosage necessary to effect a satisfactory kill. The insects used included *Tribolium confusum* Duval and *Necrobia rufipes* Fab. It was soon evident that under summer conditions the dosage could be reduced from two ounces per hundred cubic feet (the dosage recommended for cars which were not air-tight) to one and one-fourth ounces. Hence, at the outset, all cars were fumigated with hydrocyanic acid gas using one and one-fourth ounces of sodium cyanid per hundred cubic feet of space, with an exposure of one hour. It was subsequently determined that in the presence of reduced temperatures, it was advisable to increase the dosage to two ounces per hundred cubic feet. The formula employed in the generation of the gas is two and one-half fluid ounces of sodium cyanid in solution (which is made by dissolving two hundred pounds of sodium cyanid containing from 50% to 51% cyanogen in fifty gallons of water), one fluid ounce of commercial sulphuric acid (about specific gravity 1.84 or 66° Baume) and one fluid ounce of water. The cars are exposed to the gas for a period of one hour; and upon completion of the exposure, the doors at either end of the house are opened and the units allowed to aerate.



(Fig. 4)

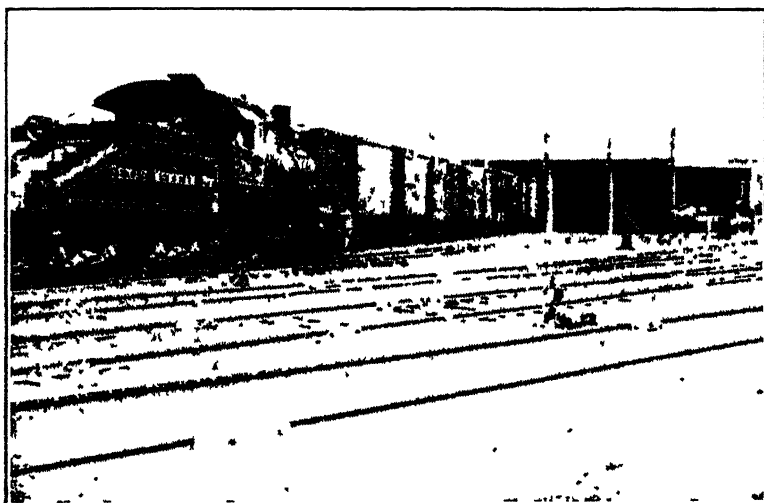
Twenty-car Fumigation House at Laredo, Texas. Probably the largest of its kind used exclusively for fumigation purposes.

When the first houses were constructed, it was assumed that it would be necessary to use exhaust fans to remove the gas. It was soon learned however, that these fans were not necessary, and their use was discontinued. Fortunately, the houses are so situated that once the doors are opened, full benefit is derived from the prevailing breeze, a

current of air immediately rushing through the car units. The cars are seldom removed until the units have been allowed to air from fifteen to thirty minutes. The railroads concerned are responsible for the placing of the cars in and removing them from the houses. All cars are examined for stowaways immediately before their entry into the units.

### Fumigation Houses

As previously indicated, the five car-fumigation houses on the Border vary in size and will accommodate from six to twenty cars at a single exposure. In order to avoid the necessity of wasting gas, one



(Fig. 5)

Cars entering the twenty-car fumigation house at Laredo, Texas.

of the units of each house is so constructed that by the use of sliding doors, it is possible to fumigate any number of cars from one to the capacity of the unit.

The houses are all constructed of brick; however, the recently completed Laredo house (Figs. 4 and 5) is the only one considered fire-proof. Heavy doors swung on hinges are used for making the units air-tight, with the exception of the doors of the house at Laredo. On account of the breeze which prevails on the Border and the weight and shrinkage of the doors, a different type was adopted in the construction of the new Laredo house. A single door at this plant covers the entire opening of the unit, and instead of working on hinges, it is conducted underground by means of counter weights.

Space will not permit a description of each house on the Border;

however, a brief description of the Laredo house, which is perhaps the largest structure of the kind in the world used exclusively for fumigation purposes, is given. This house is 235' long and 57' 5" wide (outside dimensions). It is divided into four units, three of which will



(Fig. 6)

Four generators in the fumigation room of the Laredo house. Note mixing tanks immediately above the generators.

accommodate five cars each, and the fourth any number from one to five. The units, which are separated by brick walls 1' 1" thick, are 235' long by 13' wide and 16' high. The roof over the entire building is of reinforced concrete, over which has been placed, for the purpose of making it thoroughly waterproof, standard Barrett roof covering, followed by a coat of hot asphalt about  $\frac{1}{4}$ " in thickness. This house is also provided with a room in which the generators are located, a small office, and ample facilities for the storage of chemicals.

The generators (Figs. 6 and 7) in which the gas is developed are simple in design and consist of boiler plate or black iron which is lined with lead homogeneously bonded to the metal. These generators are cylindrical in shape, 30" high by 24" in diameter (interior dimensions). The top is provided with four openings, one of which is used for the introduction of the cyanid in solution and water, a second for the acid, the third for the exit of the gas, and the fourth to relieve back pressure. The bottom of the generator is slightly constricted and is pro-

vided with an outlet through which the residue, upon the completion of the exposure, is allowed to escape by means of a lead lined valve.

Suitable tanks are provided for measuring the cyanid in solution, the acid, and the water. The cyanid is dissolved in a tank which is provided with a basket which when revolved, hastens the dissolution of the cyanid. This tank is connected with the measuring tanks, which are situated immediately above the generators, by a pipe and the entry of the solution is controlled by a valve. The sulphuric acid is similarly conducted from the drum (Fig. 7) to the acid measuring tanks.



(Fig. 7)

Acid drum at extreme left and top of picture (El Paso, Texas).

In a like manner, pipes lead from the bottom of the solution and acid measuring tanks into the generators. Here also the flow of the cyanid in solution and acid is controlled by valves. There is in addition a tank for measuring the water which is conducted to the generators in



the same manner. The chemicals are all measured prior to the arrival of the train, and hence there is no delay once the cars are in the units and the doors closed. It should be stated that all cars are examined for stowaways before they are allowed to enter the houses.

The gas is conducted from the generators to the various units to be fumigated by means of pipes. By the use of valves, it is possible to divert the gas from any generator to any unit. This arrangement is economical, since there is no delay if a given generator is out of commission or fails to work properly. Inasmuch as it is necessary to conduct the gas for a considerable distance, there is a certain amount of loss due to condensation in the pipes. Recent experiments have shown that this loss can in part be offset by forcing air through the generators and pipes upon the completion of the generation, thus making it possible to reduce the amount of chemicals necessary to secure the desired results. Air compressors are being installed, and it is believed that much of the difficulty which has been experienced in the past by condensation and clogging of the pipes with sodium sulphate will be eliminated.

The possibility of utilizing liquefied hydrocyanic acid gas is under consideration, and preliminary tests have shown that it is equally as effective, the chief objection to its adoption being its keeping qualities under high temperatures and its comparative cost with the present method. Its adoption would eliminate the necessity of using lead lined generators which have not given long service, the average life of a lead-lined generator at one of the busy plants being about one year.

A so-called "glass lined" generator, which has been successfully used by one of the commercial cotton vacuum plants, is also being tested at some of the ports.

#### Personnel and Volume of Work Performed On the Border

The personnel on the Border has changed from time to time. On June 30, 1923, there were nineteen Plant Quarantine Inspectors, two fumigation mechanics, and four laborers engaged in the activities of the Federal Horticultural Board at the six most important Border ports.

During the period from October 1, 1919 to June 30, 1923, 99,777 cars were examined and certified for entry, and of this number, 68,380 were fumigated. During the same period, 91,056 vehicles were inspected, and of that number 289 were fumigated at Del Rio, Texas. Fees amounting to \$276,804.00 have been collected and turned into the Treasury as "Miscellaneous Receipts".

## RECOMMENDATIONS FOR COTTON PRODUCTION IN 1924

The Cotton Council of the Association of Southern Agricultural Workers at its meeting in Birmingham on Jan. 10-12, made recommendations concerning cotton production in 1924 which, with slight modifications, were adopted as follows:

### Boll Weevil Control

1. That one pre-square poison application be given wherever hibernated weevils appear fairly abundant on the young cotton (20 or more weevils per acre). Treatment should be applied at the first indication of squaring. The application may be repeated if appreciable numbers of weevils are evident before the fruit blooms appear. At this time and for this particular treatment, the grower may use either:

(a) Home-mixed, molasses-calcium arsenate mixture (usual formula one pound of calcium arsenate, one gallon of molasses, one gallon of water, or, with extremely heavy infestation and with frequent rains, a stronger and more expensive mixture, containing two pounds of calcium arsenate, one gallon table quality of syrup and one-half gallon of water, which may give quicker killing and better control). In syrup mixtures, the syrup must always be sweet or unfermented and should be applied within twenty-four hours after being mixed. The usual application required is about one gallon per acre and is applied by using a homemade mop to sprinkle a few drops into the tip of the plant, or;

(b) He may use straight calcium arsenate applied either by machine, or, at this pre-square stage only, the dust may be shaken from a bag with equal effectiveness while weevils are feeding in the tips of the plants. The bag treatment is not effective on large, fruiting cotton.

Any pre-square treatment, or the Florida Method, may need to be followed up by later dusting also to secure maximum profits through protection against reinfestation, such as will always be liable to occur.

2. For the treatment of fruiting cotton generally, and especially on soils capable of producing one-third bale or more per acre normally, the calcium arsenate dusting method is most reliable and profitable and is strongly recommended in preference to late season applications of any syrup mixtures or other liquid poisons yet tested.

Dusting should begin when ten per cent of the squares show weevil puncture and at least three applications of 5 pounds per acre should be given with proper machinery and at four and five-day intervals. Thereafter dust should be applied only as needed to keep infestation

below twenty per cent until after a full crop of bolls has been set and has become well grown.

3. The Florida Method, though not yet as extensively tested as may be desirable under a wide range of soil fertility, fertilizer applications, and varying climatic conditions, seems to be applicable to the coastal areas and other areas where hibernated weevils are likely to be extremely abundant, the early summer rainfall normally high, and where yielding capacity of soils is relatively low, and where, therefore, heavier expenditures for poisoning cannot be incurred.

4. Early picking of the crop should be followed wherever possible by immediate deep burial of the green cotton stalks to destroy the food supply of adult weevils, to prevent the emergence of the late fall generations, and to remove favorable shelter conditions for weevil hibernation. Exceptions may be made where winter erosion of soil follows fall plowing.

5. Community-wide action in weevil control may add greatly to the effectiveness of each of these measures. Therefore, the co-operation of all growers, whether owners or tenants, should be enlisted in putting into effect this fundamental program for weevil control for 1924.

### Variety and Cultural Practices

1. Prepare ground early so as to have a firm, smooth, well-settled seed bed at planting.

2. Delay planting until danger from frosts and cold is past and the soil is warm enough to give prompt germination and vigorous growth. Plant one bushel or more seed per acre. A perfect stand is immensely important. As nearly as practicable all cotton in the same community should be planted at the same time and be of the same variety.

3. Plant if possible only selected seed of an improved variety, having a staple not less than seven-eighths inch recommended by the State Experiment Station for the section and soil in question. It is definitely proven that increased yields worth from \$10 to \$40 per acre may be secured by planting selected seed.

4. Width of cotton rows should be from three to four feet, depending on the fertility of the soil. Spacing in the row should be from eight to twelve inches with one to three stalks to the hill. The closer spacing and thicker stands are recommended for the poorer soils and for sections which commonly suffer from heavy weevil infestation and frequent summer rains.

5. Cultivate shallow and often enough and as late as necessary to keep the crop entirely free from weeds and grass.

### Soils and Fertilizers

The committee recommends that for the production of cotton in 1924 every possible encouragement be given to the selection of the best soil on the farm. To this end, we would stress the use of only the well-drained, fertile lands and, when available, the early soils.

We also recommend the further use of soil improving practices. To this end, we urge the growth of summer legumes and of winter cover crops as often as is practicable in the cropping system to help supply nitrogen and organic matter.

As for the kind and quantity of fertilizers to be used on various soil types, we advise the farmer to be guided by the recommendations of the experiment stations.

### Plant Diseases

When soil is infected with cotton wilt fungus, we recommend that good seed of Dixie-Triumph, Toole, Lewis-63, and other varieties known to be highly resistant to wilt and early enough to prove productive under boll weevil conditions be planted. Where root knot and wilt are present, we recommend that a rotation be practiced to rid the soil of nematodes, followed by the best wilt resistant varieties. A three-year rotation may include corn, small grain, peanuts, velvet beans, and Brabham or Iron peas.

For anthracnose control, we recommend two-year rotation and the use of seed free from disease.

Where angular leaf spot, black arm and bacterial boll rot is serious, we recommend delinting the seed with sulphuric acid.

### Economics of Cotton Production

Not more acres, but more cotton to the acre; greater efficiency in every phase of cotton production; a well-balanced, self-supporting farm unit; soil building; liberal fertilization and co-operative marketing were recommended.

## Plant Diseases In Mississippi During 1923

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(By H. D. Barker and D. C. Neal)

There are undoubtedly many people in the state who would be interested to know what plant diseases occurred in Mississippi during the past season, how prevalent they were, the date these appeared, and

how much damage was caused by them, what successes various control measures gave, etc. The purpose of this report is to present briefly the information obtained by the Section of Plant Pathology that appears to be valuable in this connection. The Office of Plant Disease Survey of the U. S. Department of Agriculture, realizing the importance of this information, compiles each year such reports from each state. The report embodied in this circular is made possible by the co-operation of the Office of Plant Disease Survey of the U. S. Department of Agriculture, the Mississippi Experiment Station, the Mississippi State Plant Board, the Mississippi Extension Department, and various plant growers who send in specimens for identification.

It is particularly important to realize that a great many factors contribute to the development and destructiveness of plant diseases. There may be present each year sufficient inoculum to produce an epidemic when suitable conditions are provided. For example, humidity and temperature are two very important factors affecting both host and parasite. Temperature and moisture conditions most favorable to one disease may not be the optimum conditions for the development of another disease. The March freeze and the excessive rainfall of last spring delayed many of the crops, particularly the truck crops, so that they were pushed into the later and somewhat warmer summer temperatures than these crops are normally subjected to. Furthermore the excessive moisture during the past growing season aided the development of several epidemic diseases. There are many other seasonal factors and environmental conditions that contribute to the development of diseases. During the past season the following diseases appeared in epidemic form in this state:

Crown rust of oats, cotton anthracnose, rye anthracnose, alfalfa anthracnose, corn rust, early blight of tomato, blossom-end rot of tomato, carrot blight, black rot of cabbage, soft rot of cabbage, watermelon anthracnose, canteloupe anthracnose, pecan scab, pecan anthracnose, black-pit of pecans, grape downy mildew, grape anthracnose, bacteriosis of peach, black spot of roses, and several other diseases that developed too late to cause serious general damage, and quite a few that appeared in epidemic form locally only.

This report includes 175 diseases of 75 different kinds of plants. A few of these are apparently new to science. Several new diseases or new hosts are recorded for the first time in Mississippi. Available literature indicates that althea, apple, deutzia, euonymus, forsythia, hydrangea, justica, plum, privet, and weigela have not been reported previously as hosts of *Heterodera radicicola*, causing root knot. Privet appears to be a new host for *Bacillus tumefaciens*, the crown gall organism. In addition, the following diseases, according to the Section of Plant Pathology, were reported for the first time in Mississippi:

**Anthrachnose of sweet clover; pod blight of beans caused by *Dia-***

*porthe phaseolorum*; blight of carrots caused by *Macrosporium carotae*; anthracnose of cucumber caused by *Colletotrichum lagenarium*; Mosaic of sweet potato; anthracnose of pepper caused by *Glomerella piperata*; root knot of strawberry; various rose cankers; and several other diseases of minor importance.

## FIELD CROPS—FIBER, CEREAL, AND FORAGE CROPS

### Cotton

Anthracnose (*Glomerella gossypii*): First reported April 30 from Washington County where the stand was badly impaired, due to the killing of seedling plants. The disease was unusually severe throughout the State this year on young and old plants. The excessive rainfall was no doubt partly responsible for the seriousness of this disease. Reduction in yield was estimated at 4 per cent. In some fields where seed was obtained from healthy plants last year the damage was considerably lessened. The planting of two or three year old seed also appeared to lessen the seriousness of the disease.

Wilt (*Fusarium vasinfectum*): First reported June 28 from Oktibbeha County. Generally distributed over the State. Particularly serious where rotation has not been practised, or resistant varieties used. Reduction in yield was estimated at 3 per cent. Delfos-6102, Express-350, and Saulsbury among the long staples were quite resistant to the disease. Lewis-63, Tri-Cook, Miller, Covington-Toole, Acola No. 5 among the short staple varieties were quite resistant.

Root knot (*Heterodera radiculicola*): One report June 30, from Pearl River County. Local injury in the field.

Angular leaf spot (*Bacterium malvacearum*): Date of first report June 15, Pearl River County. Generally distributed throughout the State, but damage very slight. The disease ranks as a minor disease in this State.

Fertilizer injury: Caused by the excessive application of nitrate of soda. Leaves parched and leathery, simulating spray injury. One report, August 15, from Scott County.

### Corn

Leaf spot (*Helminthosporium turcicum*): Observed September 3 in Oktibbeha County. Damage appeared to be very slight.

Smut (*Ustilago zeae*): Reported September 8, from Oktibbeha County. Probably general throughout the State. This disease did not appear to be very serious this year.

Brown spot (*Physotherma zeae-maydis*): First report June 28, Oktibbeha County. Generally distributed throughout the State. Injury resulted in the spotting of the leaves and decay of the stalk so that many stalks were broken over. The disease was serious where proper

rotation had not been practised. Estimated reduction in yield for the State was 0.5 per cent.

Rust (*Puccinia sorghi*): First observed July 15, in Oktibbeha County. General throughout the State on late corn. In certain cases on very late corn there seemed to be considerable damage this year.

### Oats

Crown rust (*Puccinia coronata*): Date of first report October 9, from Oktibbeha County. Prevalent throughout the State, particularly serious in the southern counties along the coast. Damage ranging from rather slight in the northern counties to almost complete loss of the crop in the coastal region. In some fields in the coastal counties there was little or no seed produced in some fields and many of the plants were completely killed. Loss for the entire State was estimated at 6 per cent.

Smut (*Ustilago avenae* and *Ustilago levis*): Date of first report April 24, from Attala County. Serious losses were caused in several parts of the State, particularly where seed treatment had not been made. The loss for the State was estimated at 3 per cent.

Crown rot, and root rot (*Bacterium* spp. apparently): In some fields this seemed to be quite serious. Bacteria were isolated from badly affected plants, but the relationship to the disease was not definitely determined.

Winter injury: The March freeze caused considerable loss throughout the State.

Anthraxnose (*Colletotrichum cereale*): One report from Washington County on April 30. Distribution throughout the State not known. Damage where observed not great.

### Rye

Anthraxnose (*Colletotrichum cereale*): Date of first report October 24, from Oktibbeha County. This disease was found to be very serious throughout the State. Injury resulted in the blighting of the heads and culms, breaking over of the plants, and lesser injuries in the nature of serious leaf spots. Most of the common varieties appeared to be badly injured. The growing of rye is being abandoned in certain instances due to the seriousness of this disease. Variety tests and selection experiments for resistance will be conducted during the coming season.

Leaf rust (*Puccinia dispersa*): First report April 26, Coahoma County. Disease quite general throughout the State on rye. Damage probably very slight.

### Wheat

Very little wheat is grown in the State, except in the northern and northeastern counties.

Loose smut (*Ustilago tritica*): First report June 24, Panola County. Less than 1 per cent reduction in yield.

Stem rust (*Puccinia graminis*): On June 24, in Panola County, a 10 per cent infection was found quite generally distributed over the field. Loss slight.

Leaf rust (*Puccinia triticini*): Observed April 17, in Oktibbeha County and later in Panola County. 90 per cent of the plants were infected. Damage rather slight.

Scab (*Gibberella saubinetii*): A trace was found June 24, in Panola County.

Glume blotch (*Septoria nodorum*): On June 25, 50 per cent of the plants in a field in Panola County showed infection. Damage slight.

### Barley

Practically no barley is grown in the State. Observations here recorded were made on the plots of the A. and M. College farm.

Covered smut (*Ustilago nuda*): Observed May 23: 20 per cent loss.

Spot blotch (*Helminthosporium sativum*): Observed April 17. 5 per cent of plants infected. Probably 1 per cent loss.

### Sugar Cane

Mosaic (cause unknown): This is by far the most serious disease of sugar cane in the State. It is quite generally distributed throughout the sugar cane growing area, particularly in the extreme southern portion of the State. The reduction in yield for this State was estimated at 4 per cent. Resistant varieties have not been introduced in this State. Selection of seed cane from disease-free fields is the only practical control measure used in the State. The Experiment Station is planning the introduction and test of certain resistant varieties.

Pineapple disease (*Thielaviopsis ethacetica*): First reported from Jones County on April 16. The disease was later reported from two or three other sections of the State. There seemed to be considerable damage from this disease locally.

Root rot (*Marasmius plicatus*): One report, April 16, from Jones County. Damage serious locally.

### Sorghum

Anthracnose (*Colletotrichum cereale*): Date of first report June



22, from Pearl River County. Prevalent throughout the State, causing spotting and discoloration of the leaves, particularly the lower leaves. Damage slight.

Leaf spot (*Cercospora sorghi*): Reported September 15, from Oktibbeha County. Associated with anthracnose. Damage slight.

Rust (*Puccinia sorghi*): One report August 30, from Oktibbeha County. Damage slight.

Kernel smut (*Sphacelotheca sorghi*): First observed September 30, in Oktibbeha County. Generally distributed, causing considerable loss of seed. Badly affected plants also appear to be somewhat stunted.

### Alfalfa

Anthracnose (*Colletotrichum trifolii*): Date of first report April 10, from Bolivar County. Disease general and serious throughout the State, particularly in the Delta region where most of the alfalfa is grown. Some large fields were abandoned on account of the disease. Loss for the State was estimated at 3 per cent. Where the disease is serious, crop rotation is recommended. From investigations now in progress at the Central and Delta Experiment Stations it appears likely that resistant varieties can be developed to overcome this disease.

Leaf spot (*Pseudopeziza medicaginis*): First reported March 28, Oktibbeha County. General throughout the State. Damage slight.

Rust (*Uromyces striatus*): Date of first report August 14, Oktibbeha County. Prevalence over the State is not known. There appeared to be considerable damage locally.

### Red Clover

Powdery mildew (*Erysiphe polygoni*): Date of first report May 1, from Panola County. Generally distributed over the State this year, but not in epidemic form as was the case last year.

### Sweet Clover

Anthracnose (*Colletotrichum trifolii*): Date of first report May 20, from Montgomery County. Several fields of Hubam in the Delta region showed serious losses.

### Bur Clover

Anthracnose (*Colletotrichum trifolii*): First observed June 12, in Oktibbeha County. Distribution over the State not known; however, several serious local infestations were observed.

### Cow-peas

Powdery mildew (*Erysiphe polygoni*): One report August 13, in

Oktibbeha County where a heavy infestation on late peas was noted. Damage, however, apparently slight.

Wilt (*Fusarium vasinfectum tracheiphila*): Date of first report August 1, from Montgomery County. The disease was generally distributed over the State and appears to be our most serious disease of cow-peas. A 2 per cent reduction in yield was estimated for the State.

Leaf spot (*Cercospora cruenta*): First report August 15, from Oktibbeha County. Nature of injury consists of leaf spotting and finally the shedding of leaves. Distribution general, but damage probably slight.

### Peanuts

Leaf spot (*Cercospora personata*): One report September 30, from Oktibbeha County. Damage slight.

Southern blight (*Sclerotium rolfsii*): One report September 30, from Oktibbeha County. Local damage in fields where tops die and the crowns and roots of the plant rot.

### Johnson Grass

Anthraxnose (*Colletotrichum cereale*): First report June 28, Oktibbeha County. Generally distributed throughout the State, causing spotting and discoloration of leaves. Damage rather slight.

### Meadow Foxtail

Downy mildew (*Sclerospora graminicola*): One report May 20, from Oktibbeha County.

### Paspalum

Ergot (*Claviceps paspali*): First report August 1, from Oktibbeha County. Infection general and heavy throughout the State. The honey-dew stage of this disease causes spotting and discoloration of clothes that come in contact with it. Also ergot sometimes causes serious poisoning of stock.

## VEGETABLE AND TRUCK CROPS

### Beans

Anthraxnose (*Colletotrichum lindemuthianum*): This disease was first reported April 27, from Copiah County. It is generally distributed and is perhaps the most serious disease of beans in the State. Reduction in yield for the State was estimated at 3 per cent. Due to the excessive rainfall, this disease was somewhat more serious during the past season than during normal years. In some sections satisfactory control is being obtained by securing seed relatively free from the disease. In a few instances growers produce their own seed late in the season when anthraxnose does not develop.

Mosaic (cause unknown): The first appearance of this disease was noted April 30 in Washington County. In importance it ranks second to Anthracnose. It was generally distributed throughout the State and caused a loss of approximately 2 per cent of the crop. Seed free from the disease demonstrated the practicability of this method of control.

Pod blight (*Diaporthe phaseolorum*): One report June 9, from George County. According to our records, this is the first report of the disease in this State. The prevalence and geographic distribution in the State is not known. It appeared to cause much damage where observed.

Rust (*Uromyces appendiculatus*): Two reports of this disease from Yazoo County were made in September. It was probably not very general or very serious in the State this year.

### Beets

Leaf spot (*Cercospora beticola*): One report on June 9, from Oktibbeha County. Prevalence and distribution not known. Damage probably slight.

### Cabbage

The cabbage crop around Crystal Springs, the main trucking center of the State, was very seriously damaged this year by diseases. Several factors contributed to the seriousness of diseases in that section this year. Elsewhere in the State similar conditions probably existed, although in cabbage grown for home use a greater per cent of the crop was saved than in the trucking section where the most is shipped.

Black rot (*Bacterium campestris*): First report of this disease was on April 30, from Washington County. The disease was serious and general throughout the State. The estimated reduction in yield was 5 per cent, although in the trucking section around Crystal Springs the loss averaged 10 per cent of the crop. Some fields were completely destroyed. It appeared upon investigation that a great deal of the infection was due to diseased plants brought into the State for planting purposes. The peculiarly favorable weather conditions caused the disease to spread so rapidly that very great damage resulted. It is urgently recommended that a repetition of this disaster be prevented by growing plants at home from disease-free seed under conditions of proper sanitation.

Yellows (*Fusarium conglutinans*): Date of first report May 22, from Tate County. This disease appeared in several localities in the State, particularly on late cabbage grown on "cabbage sick" soil. In the trucking section this year it was more serious than during former years, due to several factors, the March freeze, together with unfavorable growing conditions in the spring which greatly delayed the crop.

Thus, the crop was not harvested until slightly later than the average time. This disease makes most satisfactory progress only in warm weather, consequently the opportunities for infection were greater than in previous years. The loss for the State was placed at 1 per cent. Individual fields in certain instances suffered more than a 50 per cent loss.

Soft rot (*Bacillus carotovorus*): The first report of this disease was made May 23, from Copiah County. Much rotting occurred in the fields throughout the State. Reports from shippers indicated very severe losses during transit. The total loss for the State from this disease was estimated at 4 per cent.

#### Carrot

Blight (*Macrosporium carotae*): This disease was first reported January 29, from Hancock County, where it did considerable damage on winter-grown carrots. On the May crop in the trucking areas of Copiah County considerable damage was caused about harvest time. The blighting of the tops renders the carrots unmarketable for shipping purposes, since the retail merchant demands that the tops be green and healthy. Spraying demonstrations with Bordeaux mixture were not satisfactorily tested.

Southern blight (*Sclerotium rolfsii*): Reported May 23, from Copiah County, where rotting occurred locally in several fields.

#### Collard

Southern blight (*Sclerotium rolfsii*): One report on November 7, from Harrison County. Distribution not known. Damage slight.

#### Cantaloupe

Downy mildew (*Pseudoperonospora cubensis*): First report July 30, from Oktibbeha County. It was later reported from Lauderdale County. The distribution and prevalence of this disease throughout the State is not known. According to our records, this is the first report in the State. Where observed it occurred in epidemic form, but developed too late to cause serious damage.

Anthraxnose (*Colletotrichum lagenarium*): This disease was quite general and serious this year. The loss for the State was estimated at 1 per cent.

#### Cucumber

Downy mildew (*Pseudoperonospora cubensis*): Reported August 1, from Oktibbeha County. A heavy epidemic developed in many fields, but was too late to cause serious damage.

Bacterial wilt (*Bacillus tracheiphilus*): One report June 16, from Stone County. Serious damage locally, apparently not generally distributed over the State.

Anthrachnose (*Colletotrichum lagenarium*): One report September 20, from Jackson County, where a heavy infection was found. Probably not generally prevalent throughout the State.

Powdery mildew (*Erysiphe polygoni*): One report April 20, from Jackson County, where a 75 per cent loss occurred in one greenhouse.

### Irish Potatoes

Mosaic (cause unknown): Date of first report May 16, from Newton County. This disease is the most destructive one occurring on Irish potatoes in this State. A 5 per cent loss was estimated for the State. Greater attention should be paid to securing seed from disease-free fields. A campaign for the use of certified seed is being waged in the State.

Wilt (*Fusarium oxysporum*): First report May 16, from Marion County. Loss for the State was estimated at 0.5 per cent.

Leak (*Pythium debaryanum*): One report August 15, from Oktibbeha County. Considerable local damage occurred.

Spray injury: One field was badly damaged according to report of June 24, from Wayne County.

Dry rot (*Fusarium* spp.): One report October 15, from Oktibbeha County, showed considerable rotting in the storage house from the spring crop.

### Sweet Potatoes

Black rot (*Ceratostomella fimbriatum*): Date of first report April 7, from Lee County. The disease was general throughout the State this year, but the damage was very greatly reduced due to strict quarantine measures of the Plant Board, seed bed, and plant inspection, careful disinfection of storage houses, and proper rotation.

Stem rot (*Fusarium batatis* and *F. hyperoxysporum*): Date of first report June 14, from Jackson County. The activities of the State Plant Board indicated under the discussion for black rot have greatly lessened the losses occurring from this disease also. Loss for the State was not more than a trace during the past season.

Surface rot (*Fusarium oxysporum*): This disease was somewhat more serious than during average years on account of the excessive rainfall at harvest time. The loss for the State was probably 3 per cent.

Mosaic (cause unknown): First report of the disease in this State occurred October 8, from Marshall County. Damage slight. Distribution over the State not yet determined.

White rust (*Albugo ipomoeae panduranae*): One report from Oktibbeha County on September 15. Relatively unimportant.

Southern blight (*Sclerotium rolfsii*): One report on September 15, from Oktibbeha County. Importance slight.

Soft rot (*Rhizopus nigricans*): First report April 8, from Lee

County. Common and rather destructive where proper storage conditions are not provided.

Scurf (*Monilochaetes infuscans*): First report April 30, from Harrison County. General throughout the State, but damage slight.

#### Mustard

White rust (*Albugo candida*): One report November 2, from Hinds County.

#### Pepper

Anthrachnose (*Glomerella piperata*): One report August 15, from Oktibbeha County. Leaves and fruits badly spotted.

Southern blight (*Sclerotium rolfsii*): One report September 10, from Pearl River County. Injury slight.

Sun scald: One report July 22, from Pike County. Many of the fruits were badly injured.

#### Watermelons

Anthrachnose (*Colletotrichum lagenarium*): First report July 1, from Covington County. The disease was general over the State this year and more destructive than usual. A 2 per cent loss was estimated for the entire State. Many fields, particularly in the late fields, were almost completely ruined by the disease. Properly conducted spraying was not generally used throughout the State, but gave good results where it was so conducted.

Stem end rot (*Diplodia* sp.): First report July 4, from Lauderdale County. General, but damage slight

#### Tomatoes

Wilt (*Fusarium lycopersici*): The disease was first reported May 24, from Copiah County. It was general throughout the State and caused an average loss of approximately 10 per cent of the crop. The wilt-resistant selections of Norton and Marvel distributed by the Experiment Station gave excellent results for the control of the wilt, even on badly infested soil.

Blossom end rot (cause unknown): This disease was far more prevalent and destructive than usual, probably on account of the excessive rainfall during the growing season. In fact, it ranked almost as important as wilt in the destruction of the tomato crop this year. The loss for the State this year was estimated at from 8 to 10 per cent.

Bacterial wilt (*Bacterium solanacearum*): One report of serious local damage from Pearl River County on August 15.

Mosaic (cause unknown): A heavy infection was found in Copiah County in one field on May 28. Probably general throughout the State, causing considerable local damage.

Early blight (*Alternaria solani*): First report April 4, from Copiah County. The disease found very favorable conditions for its development this year and caused an unusual amount of damage through-

out the entire State. Proper spraying where practised gave excellent results. It was estimated that a 5 per cent loss of the crop occurred.

Southern blight (*Sclerotium rolfsii*): One report June 15, from Pearl River County.

Damping off (*Rhizoctonia* sp.): Date of first report May 1, from Washington County. Considerable damage occurred in many seed beds.

## FRUITS

### Apple

Blotch (*Phyllostica solitaria*): Date of first report May 14, Newton County. This disease has been found to be very serious in several localities in the State, and especially in several nurseries. The annual loss in the State from this disease is about 3 per cent. Ben Davis, Missouri, Pippin, Mammoth, Black Twig, Maiden Blush, and Delicious are susceptible to blotch, while Jonathan, Wine Sap, York Imperial, and Yates are almost immune. Thorough spraying with 3-4-50 Bordeaux mixture during the summer and continuous care of the orchard from year to year as to matters of pruning should lessen the losses from this disease.

Black rot (*Physalospora cydoniae*): Reported on June 25, from Attala County. Serious in orchards in the northern part of the State where spraying and good cultural practice has not been followed.

Rust (*Gymnosporangium juniperi-virginianae*): Date of first report June 24, Panola County. Not generally distributed in the State and of minor importance.

Crown gall (*Bacterium tumefaciens*): Date of first report May 17, Newton County. This disease is very serious, especially in the nursery. The infection in some of the nurseries has been found to be as much as 50 per cent. Early Harvest, Early May, and Yates appear to be more susceptible than McBride, Delicious, and Red June. Planting of trees that do not show evidence of the disease, usually manifested by galls on the roots, and careful attention to disinfection of pruning and grafting knives in the nursery and rotation of lining out stocks are recommended as control measures.

Fire blight (*Bacillus amylovorus*): Reported on April 6 this season from Leflore County. Fire blight is probably one of the most serious diseases of the apple orchard in the State. It is estimated that 90 per cent of the orchards in the State are infected. This is the same disease which attacks the pear, but in the case of the apple the disease attacks mostly the young twigs and is frequently referred to as twig blight. Many trees in the State have been found to bloom profusely, but later abundant twig infection occurs and very little fruit is set. The estimated reduction in yield for the State by this disease is about 5 per cent. The removal of cankered limbs, surplus water sprouts,

and all dead wood in the tree are necessary operations in controlling apple blight. Clean cultural practices and the destruction of old apple or pear trees growing in the vicinity of the orchard are also recommended.

Fly speck (*Gloeodis pomigina*): Reported on September 15 from Sunflower County: of minor importance this season.

Sooty blotch (*Leptothyrium pomi*): One report September 15, Sunflower County. Of minor importance this season.

Soft rot (*Penicillium expansum*): Reported September 15 from Sunflower County. Of slight importance this season.

Bitter rot (*Glomerella cingulata*): Date of first report June 6, Kemper County. This is confined mostly to the northern counties of the State and causes considerable rotting of the fruit, especially if the orchards are not sprayed consistently from year to year. The reduction in yield for the State is about 3 per cent.

#### Blackberry

Anthraxnose (*Plectodiscella veneta*): Anthracnose was reported on April 7, from Covington County. The disease caused from slight to moderate injury and was fairly generally distributed over the State.

#### Blueberry

Crown gall (*Bacterium tumefaciens*): Reported December 1, from Harrison County. Of minor importance this season.

#### Cherry

Rust (*Puccinia pruni-spinosae*): Reported on September 25, from Oktibbeha County, but the infection in this case apparently occurred too late to cause much damage. On the whole this disease is of minor importance.

Black spot Bacteriosis (*Bacterium pruni*): Reported on October 15 from Jones County, causing in this particular instance rather heavy defoliation of the trees. This is the same organism which occurs on peach. Fertilizing trees with nitrogenous fertilizer supplied in organic form is recommended as a control measure.

#### Citrus trifoliata

Melanose (*Phomopsis citri*): Date of first report May 24, Harrison County. This disease is not very serious, but is frequently found in the nursery, producing leaf spots, and on the fruits of sweet orange and grapefruit, and occasionally satsuma, it causes stem-end rot. The usual recommendations that are given for spraying citrus with Bordeaux-oil emulsion solutions will lessen outbreaks of melanose.

#### Orange

Wither-tip (*Colletotrichum gloeosporioides*): Wither-tip was reported on April 30, from Pearl River County. This disease is general in the citrus area, but where good cultural practice is followed as well as consistent spraying and pruning the disease is of minor importance.

Scab (*Cladosporium citri*): Reported on May 12, from George



County. This disease is general in the citrus area and in addition to producing early shedding of the fruit it also attacks them at later stages of maturity and produces unmarketable, or scabby fruit. This disease is frequently found in the nursery and is serious in the case of satsuma, grapefruit, and sweet orange. It causes an annual loss in the State of about 2 per cent. The spraying recommendations advocated by Winston of the Bureau of Plant Industry and consisting largely of Bordeaux-oil emulsion sprays should control scab.

#### Fig

Anthracoze (*Glomerella fructigena*): Anthracnose was reported on June 28, from Washington County and resulted in this particular case in a loss of about 90 per cent of the fruit. This disease is undoubtedly widely distributed in the State, judging from specimens which have been received in former years, and no doubt causes considerable damage. Destruction of mummied fruit, fallen leaves, and the pruning out of dead limbs and careful spraying with Bordeaux mixture during the dormant season is recommended for controlling this disease. In addition, resistant varieties, such as Celeste, are advocated.

Leaf spot (*Cercospora fici*): Reported on September 1, from Harrison County. Although present on many fig trees in the State, the disease is of minor importance.

Limb blight (*Corticium laetum*): Reported on July 27, from Harrison County. The disease has also been found in former years in various other localities. Pruning out of diseased limbs followed by thorough spraying with Bordeaux mixture is recommended.

Root knot (*Heterodera radiculicola*): Reported on May 12, from George County and generally distributed throughout the State, but perhaps more serious in the southern half. Perhaps 60 per cent of the plantings of figs in Mississippi are affected with root knot. This disease is responsible for a loss of about 3 per cent for the entire State. Frequently trees are killed by root knot and others are stunted and yield very little if any. Planting trees which are free of root knot symptoms and on land which has been freed of the parasite by the growing of resistant crops is recommended as a control measure. The Celeste variety is somewhat more resistant than the others observed.

#### Grape

Anthracoze (*Gloeosporium ampelophagum*): Reported on May 21, from Oktibbeha County. In this particular locality the disease was very serious and probably 50 per cent of the vines were affected. The disease attacks the vines, leaves, and fruit, producing more or less sunken spots with characteristic reddish margins. This disease caused a reduction in yield for the State of about 2 per cent. Spraying with Bordeaux mixture, as is recommended for black rot, and the pruning out of diseased vines, preferably during the dormant season, is recommended.

Black rot (*Guignardia bidwellii*): Reported on June 9, from Oktibbeha County. The disease was serious in several localities throughout the State the past year and it is conservatively estimated that this disease is responsible for reduction of the grape yield of about 5 per cent in the State. The Niagara and Catawba were among the more susceptible varieties observed.

Downy mildew (*Plasmopara viticola*): This disease was reported and observed in epidemic form in Oktibbeha County on several varieties. The plants were seriously damaged, the disease causing heavy defoliation in many cases. The disease was also reported from the eastern, central, and northern portions of the State. In some vineyards the amount of infection reached 100 per cent.

#### Pear

Brown rot (*Sclerotinia cinerea*): Reported on August 26, from Bolivar County. Of minor importance this season.

Fire blight (*Bacillus amylovorus*): Date of first report April 6, Leflore County. The disease was very serious throughout the entire State this season, especially on LeConte and Kiefer varieties. The Sand pear is apparently immune to blight. Fire blight is responsible for reduction in yield for the State of about 40 per cent.

Canker (*Thelephora pedicellata*): Reported on July 5, from Covington County.

#### Peach

Bacteriosis (*Bacterium pruni*): Date of first report April 9, Pearl River County. The disease was more serious on the light sandy soils and where fertilization was not consistently followed. This has been the case with this disease in former years in reports to this Office. Bacteriosis causes serious defoliation during mid-summer and frequently results in the death of the trees. The per cent of reduction in yield for the State is unknown, but in many orchards in the eastern and southern counties the amount of infection was found to be 100 per cent. The early varieties, like Carmen, Greensborough, Mayflower, and Florida Favorite, appear to be more susceptible than some of the later varieties.

Brown rot (*Sclerotinia cinerea*): Date of first report June 26, Clarke County. This disease was general throughout the State and serious in many orchards where spraying was neglected. It is estimated that this disease caused a reduction in yield of at least 3 per cent for the State.

Crown gall (*Bacterium tumefaciens*): Date of first report May 14, Newton County. This disease is generally distributed throughout the State and is quite serious on nursery stock.

Leaf curl (*Ezoesus deformans*): Reported on April 16, from Webster County and has been found to be rather prevalent and some-

times serious on seedlings. Very little of the disease has been observed on grafted trees.

Scab (*Cladosporium carpophilum*): Date of first report April 7, Wayne County. Scab is rather serious in some orchards where spraying from year to year has not been consistently followed. It is estimated that about 6 per cent of the peach orchards in the State are affected to some extent by this disease. During the last two years a considerable amount of scab has been found on nursery stock and in some instances the amount of twig infection seriously interfered with the proper growth and development of the trees. The estimated reduction in yield in the State by this disease is placed at 2 per cent. Discarding badly diseased nursery stock, and pruning and spraying the orchard from year to year, are recommended as control measures.

Rust (*Puccinia pruni-spinosae*): Date of first report September 25, Oktibbeha County. This disease is also generally prevalent throughout the State and in Oktibbeha County it caused rather serious defoliation of the trees.

Root knot (*Heterodera radiculicola*): Date of first report May 1, Leflore County. Root knot is probably the most serious of the peach diseases with which the grower is confronted. It is prevalent in many parts of the State, but is perhaps more serious in the sandy loam soils of South Mississippi. The disease causes stunting of the trees, producing large knots on the roots, and interfering materially with fibrous root development. Root knot is a limiting factor in peach growing in most of the southern counties of the State. Fully 60 per cent of the orchards in the State are affected in varying degrees with root knot. It is estimated that this disease caused a reduction in yield for the State of 5 per cent. Freeing the soil by growing resistant host plants for two or three years prior to planting peach trees on infested soil is recommended. Most of the grain crops are resistant, as well as velvet beans, Brabham and Iron cowpeas. Heavy applications of inoculated sulphur have been applied to bearing trees that were affected with root knot, and by neutralizing the soil with lime after 30 or 60 day intervals the results gave evidence of a possibility of overcoming the disease. However, definite conclusions are uncertain until further tests can be made.

Root rot (*Armillaria mellea*): Date of first report June 25, Lawrence County. Root rot has also been reported from other parts of the State, especially where orchards have been planted on new ground containing stumps and other organic matter in which the fungus lives over from year to year. Newly-cleared land should not be planted to peaches until it has been cleared of the above agencies in which the root rot fungus is carried. Soil drainage is also an important factor in overcoming this disease.

Winter injury: Several cases of winter injury were reported last season due to the late freeze which occurred the latter part of March.

### Pecans

**Anthraxnose (*Glomerella cingulata*):** This disease was rather serious in many orchards throughout the State the past year. Undoubtedly the abundant rainfall which prevailed in many parts of the State was conducive to its spread and development. Date of first report September 10, Harrison County. The pecans attacked by anthracnose revealed spotted husks, and the normal development of the husks and the filling of the kernel were inhibited. On the whole, the disease appeared rather late on practically mature nuts in most cases. Common on several varieties, particularly Stuart, Russell, Delmas, and Van Deman. It undoubtedly caused last season a loss of 1 per cent for the State.

**Black pit (cause unknown):** This disease was widespread again the past year in many counties throughout the State. Date of first report August 25, Harrison County.

**Black spot on bark (*Myrangium tuberculans*):** One report April 3, from Lamar County. This disease is rather generally distributed throughout the State, but is of minor importance.

**Black spot (*Thelephora pedicillata*):** Reported on April 3, from Lamar County. Rather generally distributed throughout the State, but of minor importance.

**Crown gall (*Bacterium tumefaciens*):** Date of first report July 11, Harrison County. Heavy infection was reported in a bearing orchard in Leflore County, the disease in this case causing a serious loss. Usually crown gall is of minor importance as a pecan disease.

**Powdery mildew (*Microspheera alni*):** Reported on May 15, from George County. The disease is rather generally distributed throughout the State, but is usually of minor importance.

**Scab (*Fusicladium effusum*):** Date of first report May 9, George County. This is an extremely serious disease of pecans and in many instances crops of susceptible varieties are failures unless spraying is followed. It is estimated that scab caused a reduction in yield for the State of 10 per cent last year. The disease causes shedding of nuts early in the season and those that are affected later are retarded in growth. Susceptible varieties include Delmas, Pabst, Success, and Schley. Resistant varieties are Stuart, Russell, Van Deman, Money-Maker, Frotscher, Moore, and Tesche.

**Winter injury:** Reported on May 10, from Jones County. Several hundred trees under four years old were seriously injured by February and March freezes, particularly where fertilized and cultivated late in the fall of 1922.

### Plum

**Rust (*Puccinia pruni-spinosae*):** Reported on September 15, from Oktibbeha County. Heavy infection in this locality, but the disease,

occurred too late to cause serious injury. Distribution rather general in the northeastern part of the State.

#### Quince

Fire blight (*Bacillus amylovorus*): Reported on June 30, from Noxubee County.

#### Raspberry

Anthraxnose (*Plectodiscella veneta*): One report on August 30, from Lowndes County.

#### Strawberry

Leaf spot (*Mycosphaerella fragaria*): Date of first report March 25, Oktibbeha County. This disease is widely prevalent all over the State and was perhaps more serious during 1923 than in former years owing to the rainy season. The disease causes spotting of the leaves and in some cases results in serious defoliation. The disease is easily controlled by spraying with 4-4-50 Bordeaux mixture as soon as the spots become noticeable.

Root knot (*Heterodera radiculicola*): Date of first report May 10, Lauderdale County. This was the first time that root knot was reported as occurring on strawberry. Importance last year very slight.

Root rot (*Fusarium* sp.): Reported on August 15, from Harrison County, where the plants were reported to be dying in a three-acre field. A *Fusarium* fungus was isolated from the diseased plants, but re-inoculations have not as yet been made. This disease was also reported from Pearl River County the latter part of August.

### ORNAMENTALS AND MISCELLANEOUS PLANTS

#### Althea

Rust (*Puccinia malvacearum*): One report from Covington County, September 24. Slight infection.

#### Buddelia

Root knot (*Heterodera radiculicola*): One report. Severe damage, Coahoma County.

#### Boxwood

Blight (cause unknown): A very serious blight, or death of boxwood plants occurred throughout the State this year. In many cases numerous plants died. Enlarged lenticels were almost invariably found on infected plants. There was some suggestion that excessive moisture, particularly standing water, was responsible for the trouble. The disease was reported May 1, from Forrest County, and was later reported from several sections of the State.

#### Carnation

Rust (*Uromyces caryophyllinus*): One report. Heavy infection in

greenhouse, April 30, Washington County. This disease probably occurred elsewhere in greenhouses. It is frequently very serious.

#### Cedar

Rust (*Gymnosporangium* sp.): Probably cedar apple rust. One report, April 28, from Tunica County.

#### *Chenopodium alba*

White rust (*Albugo candida*): One report April 30, from Coahoma County. The organism causing this disease causes white rust of the cultivated crucifers.

#### Chinaberry

Canker (*Nectria* sp.): A rather serious blighting of the limbs was caused by this disease. It appeared to be widespread throughout the State.

#### *Crataegus spathulata*

Rust (*Gymnosporangium floriforme*): One report, heavy infection, September 15, Oktibbeha County.

#### Daisy

Southern blight (*Sclerotium rolfsii*): One report June 30, from Washington County.

#### Deutzia

Root knot (*Heterodera radicicola*): One report, severe local infection in one nursery, May 11, Covington County.

#### Euonymus

Anthracnose (*Gloeosporium frigidum*): First reported May 15, from Covington County. General throughout the State. Rather serious spotting of leaves.

Powdery mildew (*Microsphaera euonymi*): One report. light infection, from Coahoma County.

#### Forsythia

Root knot (*Heterodera radicicola*): One report, May 11, heavy infection in nursery, Covington County.

Crown gall (*Bacterium tumefaciens*): One report, May 11, slight infection in nursery, Covington County.

#### Geranium

Leaf spot (*Bacterium erodii*): This disease was first reported April 4, from Leflore County. The disease was widespread over the State and caused serious damage to the geraniums.

#### Hibiscus

Crown gall (*Bacterium tumefaciens*): One report, slight infection May 1, Leflore County.

**Hollyhock**

Leaf spot (*Cercospora althaeina*): One report June 17, Monroe County. Appeared to be rather serious.

**Hydrangia**

Root knot (*Heterodera radicicola*): One report, slight infection, Coahoma County.

**Iris**

Southern blight (*Sclerotium rolfii*): One report, June 25, Oktibbeha County. Rather severe local rotting of leaf blades and bulbs.

**Ipomoea purpurea**

White rust (*Albugo ipomoeae panduranae*): General and heavy. First report August 30, Oktibbeha County.

Rust (*Coleosporium ipomoeae*): General and heavy. First report August 30, Oktibbeha County.

**Magnolia**

Leaf spot (*Phyllosticta magnoliae*): First reported April 10, from Harrison County. Very prevalent in many of the coast counties. In some cases it was so severe that shade trees became unsightly.

**Nasturtium**

Bacterial blight (*Bacterium aptatum*): One report, May 28, Lincoln County.

**Oak**

Blister or curl (*Taphrina coerulescens*): One report May 22, Clark County.

**Peony**

Root knot (*Heterodera radicicola*): One report very serious infection in one nursery in Coahoma County, April 26.

**Pine**

Rust (*Cronartium cerebrum*): One report, May 1, Attala County.

**Privet**

Root knot (*Heterodera radicicola*): Apparently general throughout the State on California privet. Other varieties in the same nursery have not been found to be affected.

Crown gall (*Bacterium tumefaciens*): Apparently widespread, although privet had not been previously listed as susceptible. Lucidum seemed particularly susceptible. Also found on California, Nelpals, and Amoor River privets.

Root rot (*Armillaria mellea*): First report August 14, from Washington County. Appears to be general and frequently causes considerable damage to hedges.

### Rose

Black spot (*Diplocarpon rosae*): Probably the most common disease of roses in the State. It does much damage to the appearance of the leaves and thus seriously affects the beauty of the cut flowers and rose bushes. Some varieties were apparently more susceptible to the disease than others. Satisfactory control of the disease was obtained by spraying with Bordeaux mixture or ammoniacal copper-carbonate.

Powdery mildew (*Sphaerotheca pannosa*): This disease ranks second to black spot in order of seriousness. Fortunately, however, it is severe on only a few varieties. Dorothy Perkins seems particularly susceptible. Most of the bush types are not as susceptible as most of the rambler types. Dusting with flowers of sulphur, or spraying with various fungicides, including common hypo (used for developing films) controls the disease satisfactorily.

Crown gall (*Bacterium tumefaciens*): General. Rather serious in many nurseries.

Cankers (*Septoria rosae*, *Coniothyrium fuckelli*, *Botrytis* sp. and apparently several other fungi): A great many cankers and "blights" of the canes have been sent in for examination. There appears to be many different kinds of cankers on roses, which are more or less serious. Our observations indicated that the *Coniothyrium* canker, or "Gray bark," was the most serious type during the past season. These diseases were more serious where careful pruning had not been practiced.

### Snapdragon

Anthracnose (*Colletotrichum antirrhini*): One report June 22, Jones County. Severe lesions on stems.

### Sweet pea

Anthracnose (*Glomerella cingulata*): Very serious this year. Leaves, stems, and flowers affected. First report May 15, from Lawrence County.

### Violet

Leaf spot (*Alternaria violae*): General. Epidemic in some localities causing most of the leaves to be killed. First report April 28, from Sunflower County.

### Verbena

Powdery mildew (*Erysiphe cichoracearum*): Rather serious in several greenhouses in the State.

### Weigela

Root knot (*Heterodera radicola*): Heavy infection in one nursery in Coahoma County.

Crown gall (*Bacterium tumefaciens*): Light infection in one nursery in Coahoma County.



## BLIGHT RESISTANT BEANS SUITABLE FOR PLANTING IN MISSISSIPPI

(By D. C. Neal)

During the last three years considerable progress has been made in determining varieties of beans that are resistant to blight. Bean blight is a bacterial disease that has been known to occur in the United States for more than 35 years. The disease is present to some extent in almost every locality and probably every field in Mississippi each season. It attacks both the leaves and pods and may frequently ruin whole fields in severe outbreaks. Sometimes blight is accompanied by anthracnose and other diseases, resulting in almost a total loss of the crop.

Blight is perhaps more noticeable on the leaves, appearing as water-soaked spots which gradually spread over large areas, finally causing the whole leaf to dry up and fall. When the disease is well-developed in a field or garden, many leaves will be seen to be entirely dead, sometimes still hanging on the plant and sometimes on the ground, while other leaves will show dead, irregular patches of various sizes. On the pods it produces irregular water-soaked patches much the same as on the leaves. The infected areas usually spread over a considerable portion of the pod and a few days later the diseased tissue gradually takes on a reddish color, this color usually appearing on the margin of the spots, later spreading over the other portions. During the later stages, the diseased tissue dries out and becomes sunken, or depressed, while the red color usually changes to a brown. Bean blight is caused by a species of bacterium known as *Bacterium phaseoli*.

Certain varieties of pole and bush beans which have been studied over a period of three years in New York have exhibited marked differences as to susceptibility and immunity to blight. In order that growers of beans in Mississippi may purchase seed of varieties which are resistant to this disease, or only moderately affected, a list of such varieties adapted to Mississippi conditions is given below. Bush varieties include Bountiful, Extra Early Red Valentine, Longfellow Bush, Burpee's Stringless Green Pod, Refugee 1000-1, Rust Proof, Golden Wax Bush, Kentucky Wonder Wax, Tennessee Green Pod, and Early Yellow Six Weeks. Resistant pole varieties include Kentucky Wonder, White Seeded Kentucky Wonder, and Texas Pole.

As the blight bacteria live over in the seed, they should be treated with some disinfectant at planting time. It is recommended that the seed be soaked for 15 minutes prior to planting in a 1-1000 solution of bichloride of mercury, as a further precaution in controlling the disease.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

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Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

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Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....	Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

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## THE DANGER FROM MEXICO

Every reader of the Bulletin will be interested in the article in this issue by Mr. E. R. Sasscer, of the Federal Horticultural Board, describing the precautions used by the Board on the Mexican Border to prevent the entry of the pink bollworm from that country. This article was written especially for the Bulletin by Mr. Sasscer because of the vital importance of the pink bollworm question to Mississippi farmers. Such splendid protection from the danger of other infestations from Mexico, supplemented by our port inspection at Pascagoula and Gulfport and our own quarantines against all the areas in other states that might be regarded as dangerous, together with the fact that scouting for this pest in all sections of Mississippi has been carried on consistently for nearly four years, should assure the farmers of this state that everything possible is being done to safeguard their interests from this new and destructive enemy. However, "to make assurance doubly sure", no farmer should overlook a single opportunity to examine his planting seed for this pest this spring, especially if the seed came from other states.

## DISTRIBUTION OF WILT-RESISTANT TOMATO SEED

During the past few days several thousand people in Mississippi have requested and received packages of wilt-resistant tomato seed from the State Plant Board. Tomato wilt is a serious and widespread disease in Mississippi and the use of resistant varieties is the only practical method of reducing the loss. As the quickest and most practical means of accomplishing this, the Experiment Stations and the Plant Board have started the production and free distribution of seed of several resistant varieties. In distributing the seed, which were grown co-operatively by these organizations last year, efforts have been made to impress everybody that only those with diseased soil should apply for the seed, and that the mere fact that the seed were free should not induce anyone to apply for them for that reason alone. Especially has it been emphasized that those receiving the seed are under an obligation to furnish their neighbors next year with seed from their increase this season. In this way, it is hoped that a supply of wilt-resistant seed will soon become available over the entire state.

The supply of seed for distribution this season has been exhausted, but plans are being made to continue the production this year, with better results it is hoped, as the abnormal rainfall last year decreased the yield considerably.

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## USING THE PLANT DISEASE SURVEY

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This issue of the Bulletin contains a list of the plant diseases reported to the State Plant Board during 1923. The purpose of this survey is to acquaint farmers, truck growers, and orchardists with the names and kinds of diseases occurring within the state, and the plants on which they are found. In a report of this kind it is impossible to give more than very brief recommendations for control measures, and in the case of minor diseases or unimportant crops, they have been omitted entirely. For detailed descriptions of diseases or control measures, write the Plant Pathologist, State Plant Board, A. & M. College, Mississippi. Readers of the Bulletin are also urged to co-operate with the Board in making surveys—of both insect and plant diseases—as thorough as possible by sending in specimens to the Plant Board.

## SCOUTING REPORTS

January 1-December 31, 1923

Cotton—For Pink Bollworm		
Properties inspected .....		454
Acres of cotton inspected .....		23,840
Corn—For European Corn Borer		
Properties inspected .....		36
Acres of corn inspected .....		283
Beans and Peas—For Mexican Bean Beetle		
Properties inspected .....		351
Acres inspected .....		311
Sugar Cane—For Mosaic Disease and Moth Borers		
Properties inspected .....		67
Acres inspected .....		76
Sweet Potatoes—For Sweet Potato Weevil		
Properties inspected .....		586
This does not include several hundred inspections made by agents of the Federal Bureau of Entomology.		
Home Orchards and Vineyards Inspected.....		595

## SWEET POTATO FIELD INSPECTION REPORT

July 1-December 31, 1923

Number properties inspected.....	409
Number acres sweet potatoes.....	816
Properties infected with Stem Rot.....	72

In 1922 the inspections showed an average of 98 hills of Stem Rot in each 100,000 hills inspected. The 1923 inspections average 25 hills of Stem Rot in each 100,000, or nearly a fourth as much disease as was found in 1922.

## REPORT OF NURSERY INSPECTOR

For October 1 to December 31, 1923

During this quarter the following certificate tags have been issued to accompany shipments of nursery stock:

Special citrus permit certificate tags-----	498
Dealers' certificate tags-----	1,388
Permit certificate tags to out-state nurseries-----	47,877
Regular certificate tags to in-state nurseries-----	28,646
Number of nurseries inspected -----	62
Acreage in nurseries inspected-----	188
Amount of Nursery Stock Inspected:	
Grafted and budded pecans-----	47,600
Seedling pecans -----	104,375
Total pecans -----	151,975
Citrus trifoliata -----	444,050
Orange -----	50,946
Grapefruit -----	1,550
Miscellaneous citrus -----	200
Total citrus -----	496,746
Apple -----	6,450
Pear -----	69,125
Japanese persimmon -----	1,500
Peach -----	31,050
Grape -----	5,000
Fig -----	2,132
Strawberry -----	425,200
Miscellaneous fruit -----	8,386
Total fruit stock (citrus excluded)-----	548,843
Rose -----	5,100
Miscellaneous ornamental -----	226,883
Total ornamental stock -----	231,483
Grand total of plants inspected during quarter-----	1,429,047

## QUARANTINE INSPECTION REPORT

For Period from October 1 to December 31, 1923

(By Geo. F. Arnold, Quarantine Inspector)

## Ships and Vessels Inspected:

From foreign ports -----	6
From U. S. ports -----	0
Total -----	6

## Parcels Inspected:

## Arriving by water—

Passed -----	0
Treated and passed -----	0
Returned to shipper -----	0
Contraband destroyed -----	1
Total -----	1

## Arriving by land, express, freight, wagon, etc.—

Passed -----	468
Treated and passed -----	3
Returned to shipper -----	0
Contraband destroyed -----	9
Total -----	480

## Arriving by mail—

Passed -----	223
Treated and passed -----	4
Returned to shipper -----	0
Contraband destroyed -----	1
Total -----	258

Grand Total of parcels inspected ----- 709

## Number of parcels on hand December 31, 1923, pending

determination as to final disposition -----	4
Total parcels passed -----	691
Total parcels treated and passed -----	7
Total parcels returned to shipper -----	0
Contraband destroyed -----	11
Grand Total -----	709

## CITRUS CANKER SCOUTING REPORT

October 1, 1923—December 31, 1923

Number of counties in the state which have at one time or another since 1916 shown canker.....	4
Number of counties showing canker October 1, 1923 to December 31, 1923 .....	0
Number of grove trees inspected October 1, 1923—December 31, 1923 .....	13,307
Number of nursery trees inspected October 1, 1923—December 31, 1923 .....	53,272
Number of <i>C. trifoliata</i> plants inspected October 1, 1923—December 31, 1923 .....	61,990
Total number of grove trees found infected June 1, 1916 to December 31, 1923 .....	3,117
Total number of nursery trees found infected June 1, 1916 to December 31, 1923 .....	51,167
Number of properties infected during 1917.....	47
Number of properties infected during 1918.....	14
Number of properties infected during 1919.....	4
Number of properties infected during 1920.....	0
Number of properties infected during 1921.....	1
Number of properties infected during 1922.....	8
Number of properties infected during 1923.....	0
Number of new properties infected during 1917.....	12
Number of new properties infected during 1918.....	1
Number of new properties infected during 1919-20.....	0
Number of new properties infected during 1921.....	1
Number of new properties infected during 1922.....	8
Number of new properties infected during 1923.....	0
Total number of properties found infected June 1, 1916 to December 31, 1923 .....	130
Total number of properties declared no longer danger centers...	130

**INSECTS AND DISEASES INTERCEPTED FROM JANUARY 1 TO  
DECEMBER 31, 1923 IN SHIPMENTS BY PARCEL POST**

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
Ant ( <i>Prenolepis longicornis</i> )	Bulb	Florida	1
Aphis ( <i>Macrosephomiella sanborni</i> )	Chrysanthemum	Georgia	1
Aphis ( <i>Macrosiphum pseudorosae</i> )	Rose	Tennessee	1
Aphis ( <i>Macrosiphum rosae</i> ) (?)	Rose	Ohio	2
Aphis ( <i>Macrosiphum rosae</i> )	Rose	Pennsylvania	1
Aphis ( <i>Myzus</i> sp.)	Rose	Georgia	1
Aphis ( <i>Myzus persicae</i> )	Carnation	Louisiana	1
Aphis ( <i>Persicae</i> ) (?)	Hibiscus	Georgia	1
Aphis ( <i>Aphididae</i> )	Rose	Ohio	1
Aphis ( <i>Rhopalosiphum rufomaculata</i> )	Chrysanthemum	Ohio	1
Apple Blotch Canker ( <i>Phyllosticta solitaria</i> )	Apple	Mississippi	2
Bacterial Leaf Spot (?) ( <i>Bacterium erodii</i> )	Geranium	Arkansas	1
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Georgia	20
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Kentucky	7
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Mississippi	15
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	New York	1
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Tennessee	4
Canker ( <i>Tubercularia fici</i> ) (?)	Fig	Mississippi	1
Chaff Scale ( <i>Parlatoria pergandii</i> )	Japonica	Louisiana	2
Chrysanthemum Gall Midge ( <i>Diarthronomyia hypogaea</i> )	Chrysanthemum	Illinois	1
Chrysanthemum Gall Midge ( <i>Diarthronomyia hypogaea</i> )	Chrysanthemum	Ohio	2
Chrysanthemum Gall Midge ( <i>Diarthronomyia hypogaea</i> )	Chrysanthemum	Pennsylvania	8



Insect or Disease	Occurring on	From	No. of Shipments infected or infested
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Arkansas	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Mississippi	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Tennessee	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Fuchsia	Ohio	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Hydrangea	Pennsylvania	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Peach	Arkansas	3
Crown Gall ( <i>Bacterium tumefaciens</i> )	Raspberry	Arkansas	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Raspberry	Missouri	2
Crown Gall ( <i>Bacterium tumefaciens</i> )	Raspberry	Ohio	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Alabama	2
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Arkansas	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Indiana	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Louisiana	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Ohio	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Pennsylvania	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Rose	Tennessee	1
Dictyosperum Scale ( <i>Aspidiotus dictyospermi</i> )	Palm	Louisiana	1
Dictyosperum Scale ( <i>Aspidiotus dictyospermi</i> )	Sweet Bay	Louisiana	1
European Fiorinia Scale ( <i>Fiorinia fioriniae</i> )	Sweet Olive	Louisiana	1
Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern	Louisiana	2
Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Fern	Mississippi	1
Fern Scale ( <i>Hemichionaspis aspidistrae</i> )	Japonica	Louisiana	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Arkansas	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Illinois	1

Insect or Disease	Occurring on	From	No. of Shipments infected or infested
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Louisiana	4
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm	Pennsylvania	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Rubber Plant	Louisiana	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Sweet Olive	Louisiana	5
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Ornamentals	Louisiana	1
Grape Scale ( <i>Aspidiotus uvae</i> ) (?)	Grape	Mississippi	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Euonymus	Louisiana	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Grape	Louisiana	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Jesamine	Louisiana	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Pomegranate	Louisiana	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Rose	Louisiana	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Sweet Olive	Louisiana	6
Latania Scale ( <i>Aspidiotus lataniae</i> )	Lilac	Mississippi	1
Lepidopterous Larva ( <i>Lepidoptera</i> )	Chrysanthemum	Ohio	1
Mealy Bug ( <i>Dactylopius citri</i> )	Begonia	Missouri	1
Mealy Bug ( <i>Dactylopius citri</i> )	Begonia	New York	1
Mealy Bug ( <i>Dactylopius citri</i> )	Begonia	Pennsylvania	1
Mealy Bug ( <i>Dactylopius citri</i> )	Coleus	Ohio	1
Mealy Bug ( <i>Dactylopius citri</i> )	Coleus	Pennsylvania	1
Mealy Bug ( <i>Dactylopius citri</i> )	Oleander	Louisiana	1
Mealy Bug ( <i>Dactylopius longispinus</i> )	Japonica	Louisiana	1
Mealy Bug ( <i>Phenacoccus colemani</i> )	Hardy Ornamentals	Illinois	1
Mealy Bug ( <i>Coccidae</i> )	Hibiscus	New York	1

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
Mildew ( <i>Sphaerotheca pannosa</i> )	Rose	Pennsylvania	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Apple	Tennessee	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Begonia	Florida	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Begonia	Georgia	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Clematis	Illinois	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Clematis	Ohio	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Fig	Alabama	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Fig	Mississippi	14
Nematode Root Knot ( <i>Heterodera radicola</i> )	Fig	Tennessee	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Hydrangea	?	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	Arkansas	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	Georgia	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	Indiana	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	Ohio	2
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	Pennsylvania	1
Nematode Root Knot ( <i>Heterodera radicola</i> )	Rose	?	1
Oleander Scale ( <i>Aspidiotus hederae</i> )	Fern	Mississippi	1
Oleander Scale ( <i>Aspidiotus hederae</i> )	Jesamine	Arkansas	1
Oleander Scale ( <i>Aspidiotus hederae</i> )	Sweet Bay	Mississippi	1
Peach Tree Borer ( <i>Aegeria exitiosa</i> )	Peach	New York	1
Purple Scale ( <i>Lepidosaphes beckii</i> )	Japonica	Louisiana	1
Rose Scale ( <i>Aulacaspis rosae</i> ) (?)	Raspberry	Nebraska	1
Rose Scale ( <i>Aulacaspis rosae</i> )	Raspberry	Ohio	1

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Grape	Louisiana	1
Scale ( <i>Aspidiotus comstockii</i> )	Japonica	Mississippi	1
Scale ( <i>Diaspis rosae</i> )	Raspberry	Arkansas	2
Scale ( <i>Lecanium lonuglum</i> )	Geranium	Louisiana	1
Scale ( <i>Lecanium numismaticum</i> )	Pine	Mississippi	1
Scale ( <i>Diaspis rosae</i> )	Rose	Mississippi	1
Scale ( <i>Parlatoria proteus</i> )	Japonica	Louisiana	1
Scale ( <i>Parlatoria proteus</i> )	Sweet Olive	Louisiana	1
Scale ( <i>Scobinaspis dentata</i> )	Japonica	Louisiana	3
Scale ( <i>Coccidae</i> )	Grape	Michigan	1
Scale ( <i>Coccidae</i> )	Peach	Michigan	1
Walnut Scale ( <i>Aspidiotus juglans-regiae</i> )	Lilac (?)	Mississippi	1
White Fly ( <i>Aleyrodidae</i> )	Hedge	Georgia	1
White Fly ( <i>Aleyrodidae</i> )	Jesamine	Mississippi	1
White Fly ( <i>Aleyrodidae</i> )	Sweet Olive	Louisiana	1
White Fly ( <i>Aleyrodidae</i> )	Verbena	Pennsylvania	1

**INSECTS AND DISEASES INTERCEPTED FROM JANUARY 1, TO  
DECEMBER 31, 1923 IN SHIPMENTS BY ALL MEANS  
OF TRANSPORTATION EXCEPT PARCEL POST**

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
Aphid ( <i>Rhopalosiphum rufomaculata</i> )	Chrysanthemum	Ohio	1
Apple Blotch Canker ( <i>Phyllosticta solitaria</i> )	Apple	Mississippi	1
Argentine Ant ( <i>Iridomyrmex humilis</i> )	Conifer	Louisiana	1
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Georgia	3
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Mississippi	3
Black Rot ( <i>Ceratostomella fimbriatum</i> )	Sweet Potato	Tennessee	2
Boisduval's Scale ( <i>Diaspis boisduvalii</i> )	Palm	Louisiana	1
Citrus Melanose ( <i>Phomopsis citri</i> )	Orange	Louisiana	1
Citrus White Fly ( <i>Dialeurodes citri</i> )	Privet	Louisiana	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Alabama	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Georgia	11
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Mississippi	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	North Carolina	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	New York	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Apple	Tennessee	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Blackberry	Texas	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Peach	Georgia	1
Crown Gall ( <i>Bacterium tumefaciens</i> )	Peach	Tennessee	1
Dictyosperum Scale ( <i>Aspidiotus dictyospermi</i> )	Palm	Alabama	2
Dictyosperum Scale ( <i>Aspidiotus dictyospermi</i> )	Palm	Louisiana	1

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
Dictyospermum Scale ( <i>Aspidiotus dictyospermi</i> )	? -----	Louisiana-----	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Kumquat-----	Alabama-----	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Palm-----	Louisiana-----	3
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Rose-----	Louisiana-----	1
Florida Red Scale ( <i>Aspidiotus ficus</i> )	Sweet Olive-----	Louisiana-----	1
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Fig-----	Louisiana-----	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Orange (fruit)-----	Alabama-----	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	Sweet Olive-----	Louisiana-----	2
Japanese Camphor Scale ( <i>Pseudaonidia duplex</i> )	?, -----	Louisiana-----	1
Long Scale ( <i>Lepidosaphes gloverii</i> )	Orange-----	Louisiana-----	1
Nematode Root Knot ( <i>Heterodera radiculicola</i> )	Grape-----	New York-----	1
Nematode Root Knot ( <i>Heterodera radiculicola</i> )	Peach-----	Georgia-----	11
Peach Tree Borer ( <i>Aegeria exitiosa</i> )	Peach-----	Alabama-----	1
Peach Tree Borer ( <i>Aegeria exitiosa</i> )	Peach-----	North Carolina-----	1
Peach Tree Borer ( <i>Aegeria exitiosa</i> )	Peach-----	Tennessee-----	1
Purple Scale ( <i>Lepidosaphes beckii</i> )	Orange (fruit)-----	Alabama-----	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Citrus trifoliata-----	South Carolina-----	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Peach-----	Alabama-----	1
San Jose Scale ( <i>Aspidiotus perniciosus</i> )	Rose-----	Louisiana-----	1
Scale ( <i>Aspidiotus</i> sp.)	Althea-----	Louisiana-----	1
Scale ( <i>Lepidosaphes pinnaeformis</i> )	Orange-----	Louisiana-----	1

Insect or Disease	Occurring on	From	No. of Ship- ments in- fected or infested
Scale ( <i>Lecaninae</i> )	Blueberry	Florida	1
Scale ( <i>Parlutoria proteus</i> )	Camellia	Louisiana	2
Scale ( <i>Scobinaspis dentata</i> )	Camellia	Louisiana	1
Scale ( <i>Scobinaspis dentata</i> )	Japonica	Louisiana	1
Soft Brown Scale ( <i>Lecanium hesperidum</i> )	?	Louisiana	1
Sugar Cane Moth Borer ( <i>Diatraea saccharalis</i> )	Sugar Cane	Louisiana	2
White Fly ( <i>Aleyrodidae</i> )	Orange	Louisiana	1

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 4

APRIL, 1924

No. 1

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.



### **MEMBERS OF BOARD**

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**R. W. HARNED, Secretary** -----**Entomologist, A. & M. College, Miss.**

# List of Growers of Mississippi Certified Sweet Potato Plants For 1924

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These growers are earnestly endeavoring to produce disease-free sweet potato plants. Their seed potatoes have been inspected while growing in the field and while in storage. The location of their plant beds has been approved by an inspector, and their certified seed potatoes have been carefully hand-culled and disinfected just before being bedded out. In addition to these precautions against black rot and stem rot, the plant beds of every Mississippi certified grower are inspected at least twice during the shipping season.

Abbreviations used below for varieties of sweet potato plants: NH—Nancy Hall, PR—Porto Rico, T—Triumph, YY—Yellow Yam, BY—Bunch Yam, FY—Florida Yam, GC—Golden Coin, SQ—Southern Queen, PY—Pumpkin Yam, D—Dooley.

## *Alcorn County—*

Edgeworth Farms	Corinth	NH-PR
Edgar Coleman	Corinth	NH
W. J. Simmons	Corinth	NH-PR
W. D. Hale	Kossuth	NH
R. W. Lemonds	Kossuth	NH
H. A. Conn	Rienzi	NH
J. F. Green	Rienzi	NH
H. C. Taylor	Rienzi	NH

## *Amite County—*

M. E. Simmons	Gloster, R.F.D.	PR
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## *Attala County—*

C. M. Brezeale	Ethel	NH-PR
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*Benton County—*

S. E. Crawford	Ashland	PR
J. D. Walker	Ashland	PR-YY
J. E. Ayres	Hickory Flat	NH
W. C. Beasley	Lamar	NH-PR

*Bolivar County—*

W. T. Coalter	Shaw, R. 1	NH-PR
D. J. Pledger	Shelby	NH-PR

*Culhoun County—*

J. L. Alexander	Vardaman	NH
J. L. Garmany	Vardaman	NH
Tom Gregory	Vardaman	NH
J. R. Kendall	Vardaman	NH
Penick & Sons	Vardaman, R. 1	NH
Ran Skinner	Vardaman	NH
W. A. Vancleave	Vardaman	NH
J. A. Griffin	Vardaman	NH-PR

*Carroll County—*

W. D. Felts	Carrollton	NH
Smith & Cearley	Vaiden	NH

*Chickasaw County—*

J. H. Hester	Houston, R. 1	NH-PR
R. L. Inmon	Houston, R. 3	NH
A. R. Lowery	Houston, R. 1	NH
E. W. McNeal	Houston	NH-PR
D. L. Overall	Houston, Star Rt.	NH-PR
T. A. Rowlette & Son	Houston	NH
W. T. Small	Houston	NH
W. H. Smith	Houston, Star Rt.	NH
D. C. Woodruff	Houston	NH
W. B. Wimberly	Houston, Star Rt.	NH
T. D. Winsett	Houston, Star Rt.	NH
Woods & Eaves	Houston	NH
C. W. Clark	Thorn	NH-BY

*Choctaw County—*

Ackerman Floral	Ackerman	NH
C. H. Graves	Ackerman	NH

*Clathorne County—*

R. W. Bruce	Hermanville	—
W. A. Fife	Hermanville	NH-PR

*Clay County—*

H. C. Cockrell	West Point	NH
E. R. Hamlin	West Point	NH

*Coahoma County—*

Chas. Ceranti	Clarksdale	NH-PR
Reno Gho	Lyon	NH-PR

*Copiah County—*

Franklin & Franklin	Crystal Springs	NH-PR
J. Z. Taylor	Crystal Springs	NH-PR
J. E. Wilson	Crystal Spring	NH

*Corington County—*

D. C. Smith	Mt. Olive	PR
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*DeSoto County—*

Gayoso Farms	Horn Lake	NH
N. A. Betts	Hernando	PR-YY-NH
J. E. Daniels	Hernando	PR-YY
T. H. Collins	Lewisburg	PR-YY

*Forrest County—*

J. A. Blair	Fruitland Park	PR
W. C. Chavers	Fruitland Park	NH-PR
W. W. Olcott	Fruitland Park	NH-PR
H. C. McMahon	Hattiesburg	PR
N. J. McMahon	Hattiesburg	PR
O. F. Parker	Hattiesburg	PR
H. L. Vickers	Hattiesburg	—
C. B. McMahon	Rawles Springs	NH-PR

*Grenada County—*

H. C. Whitaker	Grenada	NH-PR
C. H. Winters	Holcomb	—

*Hinds County—*

Sam Jamison	Edwards, R. 1	NH-PR
Standard Plant Farm	Jackson	NH-PR
J. L. Redding	Terry	PR

*Holmes County—*

J. H. Davis	Pickens	NH
J. M. Hart	Pickens	NH

*Jefferson Davis County—*

L. E. Magee	Prentiss	PR
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*Jones County—*

Wiley Shows	Ovett	PR
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*Kemper County—*

S. J. Kimbrough	Scooba	PR
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*Lafayette County—*

J. Dalton Smith	Lafayette Springs	PR
W. J. M. Purvis	Oxford	NH-YY
James H. Stone	Oxford	NH

*Lamar County—*

Jessie Phillips	Purvis	PR
J. T. Smalley	Purvis	PR

*Lauderdale County—*

A. Lowe	Toomsaba	PR
A. H. Moorman & Son	Lauderdale	PR
W. D. Skelton	Schamberville	PR

*Lee County—*

A. R. Webb	Tupelo	NH-PR
Elmer Hurt	Tupelo	—
R. W. Edgeworth	Shannon	NH
R. S. Earrey	Shannon	NH
C. H. Watts	Shannon	NH-PR
Milt Westmoreland	Shannon	NH

*Leflore County—*

A. J. Genola	Morgan City	PR
Greenwood Floral Co.	Greenwood	—

*Lowndes County—*

O. P. Brown	Steens	—
R. H. Dowdle	Columbus, R. 3	NH
D. A. Thomas	Columbus	PR

*Madison County—*

Leeds Healy	Canton, R.F.D.	PR
H. M. Ward	Canton, R.F.D.	PR

*Marshall County—*

J. G. Bell	Holly Springs	NH-PR
L. A. Boatwright	Holly Springs	NH-PR
H. McCain	Holly Springs	PR
J. D. Taylor	Victoria	PR-NH-T

*Monroe County—*

R. L. Easter	Aberdeen	NH-PR-BY
W. M. Grace	Aberdeen	NH
C. W. Judd	Aberdeen	NH-PR
M. T. Cox	Amory, R. 2	NH
K. M. Davis	Amory, R. 2	NH
H. G. Dunlap	Amory, R. 2	NH
E. L. Russell	Amory	NH

*Montgomery County—*

H. C. Miles	Kilmichael	NH
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*Panola County—*

C. L. Hartzell	Batesville	NH
G. W. Ballentine	Sardis	NH-PR

*Pike County—*

J. W. Boyd	Summit, R.F.D.	PR
Joe Williams	Summit	PR

*Pontotoc County—*

A. M. Roy	Pontotoc	PR
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*Prentiss County—*

Mrs. E. H. Adair	Booneville	NH-PR
C. B. Chase	Booneville	NH-PR-T
J. A. Horn	Booneville	PR
F. P. Newman	Baldwyn	—
W. I. Odle	Booneville	PR
Geo. M. Denson	New Site	NH-PR-YY- BY-T-GC- SQ-PY
Ed Muse	Wheeler	
J. M. Weeks	Wheeler	

*Rankin County—*

K. W. Wynn	Brandon, R. 2	NH-PR-T
W. F. Gordon	Florence	NH-PR

*Stone County—*

J. H. Breland	Perkinston	PR-T-D
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*Sunflower County—*

E. A. Hearon	Indianola	NH
J. W. Sutton	Indianola	NH-PR

*Tallahatchie County—*

Tallahatchie A. H. S.	Charleston	NH
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*Tate County—*

T. J. Henderson	Senatobia	FY
T. H. Meredith	Barr	PR-NH

*Tippah County—*

J. H. Luckett	Blue Mountain	PR
Wilson Rutherford	Blue Mountain	NH-PR
Bob Malone	Brownfield	NH-PR
G. P. Spencer	Brownfield	NH

*Tishomingo County—*

J. T. Robinson	Tishomingo	NH
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*Union County—*

G. H. Miller	Blue Springs	BY
R. P. Hitt	Ingomar	NH-PR
N. G. Scott	Myrtle	NH-PR
S. E. Eason	New Albany	PR
T. L. Grace	New Albany	NH

*Walthall County—*

Asa W. Boyd	Tylertown	PR
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*Warren County—*

J. T. Birdsong	Vicksburg	
Tom Cole	Vicksburg, M. R. A.	NH-PR-BY
Seguin Fox	Vicksburg, M. R. A.	NH-PR-BY
E. A. Tucker	Vicksburg, M. R. A.	NH-PR
W. E. Tucker	Vicksburg, M. R. A.	NH-PR-BY

*Webster County—*

Noel Skelton	Bellefontaine	NH-PR
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*Wilkinson County—*

H. A. Ford-----Centreville-----NH

*Winston County—*

E. T. Turner-----Louisville-----NH-PR

*Yalobusha County—*

Ella Frazier-----Coffeeville-----T-NH-PR

J. L. Barber-----Water Valley-----YY-PR-NH

W. B. Crews-----Water Valley-----NH

T. H. Hendricks-----Water Valley-----NH

W. E. Hudson-----Water Valley-----NH

S. F. Martin-----Water Valley-----NH

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**IMPORTANT TOMATO DISEASES OF MISSISSIPPI**

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(By D. C. Neal and H. D. Barker)

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**Damping-Off**

One of the most troublesome diseases to the vegetable grower, who is compelled to use hotbeds and cold frames to grow his early plants, is one known as "Damping-Off". The young plants become affected at the surface of the ground, the stems rot off and the plants fall over and die. (Fig. 1.) Most of the plants that are started in seed beds are subject to this disease, including eggplant, pepper, tomato, cabbage, and cauliflower. Eggplants and peppers are particularly susceptible to the disease, sometimes so seriously that nearly all the plants in a bed will die. The same disease also occurs on various field plants, the disease of cotton known as "Sore Shin" being a good example.

The disease may be caused by one or more of several fungi which live normally in the soil. The particular fungus responsible for the disease in a given case attacks the young plants during the first two weeks of their growth, killing and rotting the stems. The disease may affect only a few scattered plants in a bed, or it may spread rapidly over



large areas of the bed, if the conditions for the development of the disease are favorable

Since the fungi causing the disease are present in nearly all soils, it is almost impossible to obtain soil that is free of them. The disease, however, can usually be held in check if the proper precautions are taken. Some of these are as follows:

1. If possible, fresh soil should be obtained for the seed bed. Fresh soil usually contains less of the fungi than soil that has been used in a seed bed the previous season. If for other reasons it seems advisable to use soil that has been used before, this soil should be thoroughly soaked about six weeks before planting and kept in a moist condition. Do not let the soil become thoroughly dry and then plant the seed immediately after wetting as this usually results in a very serious epidemic of "damping-off."



Fig. 1.—"Damping Off" of tomatoes. (After J. G. Humbert, Ohio Expt. Sta. Bul. 321, 1918.)

2. It is a good practice to add sand to the seed bed soil as this makes it looser and it will dry out much faster. "Damping-off" is always worse in a wet heavy soil.

3. After the plants are up, water should be used very sparingly for the first few weeks. Only enough should be used to keep the plants from wilting. This is very important and should always be carefully observed.

4. The seed should be planted in rows about two inches apart in order to allow frequent cultivation. After the plants are up the soil should be stirred frequently. This allows the upper surface to dry out and prevents the spread of the disease. There will not usually be much "damping-off" if the surface of the soil is kept loose and dry.

5. A layer of sand added to the surface of the beds is often beneficial. This dries out more readily than the soil and thus checks the trouble.

6. The plants should be given plenty of sunlight. The disease is always worse in a partly shaded place or during periods of cloudy weather.

Plenty of sunlight, the use of as little water as possible, and frequent cultivation to keep the dust mulch on the surface, will usually hold the disease fairly well in check.

### Early Blight

A very prevalent, and frequently destructive disease of tomatoes in Mississippi is one known as "Early Blight." It is commonly referred to by growers as rust and is also sometimes called brown rust, blight, and leaf spot. When affecting the fruit, it is called nail-head rust, birds-eye, or black rot.

The disease may attack the plants at almost any stage of their development. It first becomes noticeable usually on the lower leaves of the plants in the form of small brown or black spots. These spots may be scattered and inconspicuous at first, but later, if conditions are favorable, increase in size and number. As the disease progresses, the leaves are gradually killed, the lower ones first, and later the upper ones. A badly infected plant shows the lower leaves to be dead and the remaining green leaves at the top to be badly

spotted. The symptoms of tomato early blight on the leaves are similar in many respects to the early blight of Irish potatoes, and, in fact, the cause of this trouble on both tomato and Irish potato is the same fungus, namely, *Alternaria solani*. The black, smutty covering usually accompanying the spots on the plants is nothing but a mass of spores of the fungus. Tomato leaves spotted with early blight are illustrated in Figure 2.

This disease is of especial importance, because, in addition to injuring the foliage of the plant and thereby retard-



Fig. 2.—Tomato leaf spotted with early blight. (After C. D. Sherbakoff, Fla. Expt. Sta. Bul. 146, 1918.)

ing growth, it also spots and rots the fruit. (Figure 3.) Under favorable weather conditions it is a common occurrence for early blight to destroy 50 percent of a tomato crop.

The development of the disease is simple. Spores of the

fungus are easily carried by the wind, and when there is enough moisture, they will germinate and invade the plant tissues after they have lodged thereon. After a while spots will result on which new crops of spores are produced, and again these spores will be scattered from plant to plant. If the weather is continuously wet and cloudy, the disease will soon destroy the entire crop of plants. Early blight is not a new disease. It usually occurs wherever tomatoes are grown, in varying degrees, almost every season.

*Control of the Disease.* Frequently plants become infected in the cold frames before they are set in the field, and

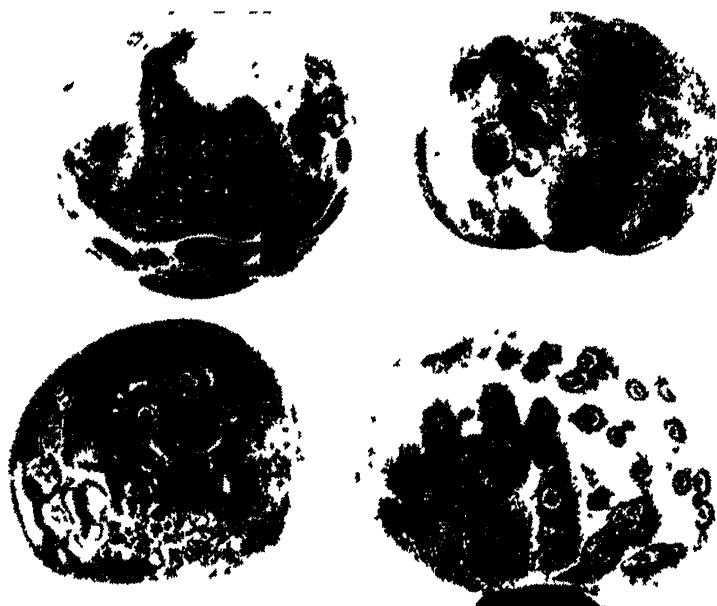


Fig. 3.—Tomato fruit spotted with early blight. (After C. D. Sherbakoff, Fla. Expt. Sta. Bul. 146, 1918.)

this point should be looked after carefully when an attempt is made to control the disease. In controlling early blight, growers should use the same precautionary measures as with tomato wilt. All of the old diseased plants should be destroyed, the soil should be changed in the cold frames each season, and a rotation of crops consistently followed.

Furthermore, the plants must be sprayed carefully and often with 4-4-50 Bordeaux mixture. The spraying is to prevent the development of the disease, therefore it pays to begin while the plants are still in the cold frame, and before the spots appear. Plants that are now showing signs of leaf spotting should be thoroughly sprayed with the 4-4-50 Bordeaux mixture. At least three applications of the Bordeaux mixture should be given at intervals of ten days or two weeks, depending upon weather conditions. If the spraying is delayed until the plants are badly diseased, very little control can be accomplished. For staked tomatoes, it is probable that the knapsack or compressed air type of spray pump will be the most satisfactory. The spray is put on as very fine mist, and for the best results, every exposed surface of the plant must be covered with the fungicide. Growers are now advised to spray both the upper and lower sides of the leaves and all parts of the tomato plants thoroughly, and to begin spraying operations immediately if early blight is noticeable on the plants.

### Mosaic

The mosaic disease of tomatoes frequently causes considerable reduction in yield. This is most marked, as a rule, in late tomatoes. In badly diseased fields the reduction in yield may be as much as 40 percent.

Tomato mosaic may exhibit such a variety of symptoms and effects that any description is more or less inadequate. This situation has resulted in some confusion in recognizing the disease in its various manifestations. Temperature, rate of growth, and age of the plant are factors which greatly influence the expression of mosaic symptoms. As a rule, the symptoms appear on the parts of the plant that are in a growing condition at the time of infection, or that develop after that time. The most characteristic symptom of the disease is the mottling of the younger leaflets, due to the appearance of lighter green, or yellowish areas of various shapes and sizes. The darker green portions are frequently raised or puffed up. This condition is illustrated in Figure 4. These effects are frequently accompanied by extreme stunting and malformation of the leaflets. (Figure 4.) The

leaflets may be distorted and crumpled, or reduced to narrow ribbons. In very severe cases, they may become thickly spotted with small, dead brown areas and curled downward about the margin, or they may be very finely crinkled. The disease may sometimes appear as elevated, greasy areas of irregular size and pattern on the green fruits. These spots, or streaks on the fruit soon become more or less dry, brown



Fig. 4.—Leaf symptoms of mosaic on tomato. A.—Leaf from a mosaic plant, showing dwarfing and distortion of leaflets. B.—Leaf from a healthy plant. (After Gardner and Kendrick. Indiana Expt. Sta. Bul. 261, 1922.)

and shrunken, and the larger lesions show numerous shallow cracks. Such lesions are superficial, but constitute very objectionable blemishes.

The cause of mosaic is usually spoken of as a “filterable virus.” In other words, the juice from a mosaic plant retains its power to produce the disease after passage through

bacteria-proof porcelain filters. It has been a much debated question as to whether the activity of this virus is due to exceedingly small organisms, invisible under the microscope and small enough to pass through the filters, or to very active, but lifeless chemical compounds such as enzymes. The disease may be readily spread from plant to plant by any process which involves the handling and wounding of the plants. Insects that feed on diseased plants may convey it to healthy plants. Undoubtedly one of the most important means by which mosaic is spread is by the handling of the plants during transplanting. The disease does not persist in the soil, neither is it transmitted in or on the seed. It persists from one season to the next in greenhouses where tomatoes are grown and may be carried to the field by insects, or by young plants grown in the greenhouse and transplanted to the field. The same disease occurs on a number of perennial weeds, such as the ground cherry and horse nettle. From these it may spread to neighboring tomato plants.

*Control.* Transplants from greenhouses and plant-beds in which tomato mosaic is present should not be used.

If such plants are used, all mosaic plants detected should be rogued out before pulling the plants. Frequent washing of the hands with soap and water will minimize the danger of spreading mosaic during the transplanting operation.

Tomato growers and tobacco growers as well should recognize in the perennial ground cherries and horse nettle a distinct danger to their crop. Drastic measures should be taken to eradicate these weeds in and near seed-beds, plant-beds, and greenhouses to be used for tomatoes. A zone 200 to 400 feet wide should be kept free of these weeds. Furthermore, during the early part of the season, these weeds should be destroyed or at least kept down in and around the tomato field by frequent cultivation and hoeing. A zone 100 to 200 feet wide around the edge of the field should be included in this campaign. When the rootstocks are not destroyed, new shoots reappear promptly and frequent attention to their destruction is essential. Other related perennials such as bittersweet and matrimony vine and re-

lated annual weeds such as nightshade, Jimson weed, and certain ground cherries should be destroyed in and near plant-beds and tomato fields. Greenhouses to be used for tomatoes should be kept free of voluntary tobacco and tomato plants, petunias, and all the related weeds and ornamentals. Plant-beds should be kept clear of all weeds and remnant tomato plants during the summer and should not be used for peppers or eggplants.

It is advisable not to grow potatoes near tomato fields.

If mosaic is detected in the field on a few tomato plants early in the season, these should be destroyed since they may otherwise serve as centers of infection. This is also important in the greenhouse crop just before the pruning operation.

Control of the insect carriers such as plant lice and flea-beetles is advisable in greenhouses and plant-beds and, if feasible, in the field during the early part of the season. Greenhouses may be fumigated with nicotine or hydrocyanic acid. A Bordeaux spray with nicotine sulphate and an arsenical added may be used in the plant-bed and the field.

### **Blossom-end rot**

Blossom-end rot is one of the most serious diseases of tomatoes in this State. In some seasons it destroys a very large portion of the crop.

*Symptoms.* The disease as a rule makes its appearance on the fruit when it is from one-half to two-thirds grown. At first a small, blackish spot is seen, either around the remains of the style, or on one side of it; this rapidly increases in size, but retains a more or less circular outline. As the disease progresses, the tissues collapse quite regularly on all sides and the fruit becomes flattened. There is usually a slightly raised, narrow border surrounding the diseased parts, while just outside the cuticle retains its normal color, but appears slightly wrinkled owing to the collapsed condition of the tissue beneath. Sections through the tomato at this stage show that the black discolorations extend deeply into the tissues, the depth depending somewhat on the size of the spot. As the malady progresses the diseased parts



become hard and leathery, the surface assumes a greenish-black, velvety appearance, and finally the entire fruit becomes dried and shrivelled. (Figures 5 and 6.)

*Cause.* The cause of the disease is not very well understood. Much excellent work has been done on this subject. It seems quite clearly established that it is not produced by any of the parasitic organisms, either bacteria or fungi. It is not an infectious disease. The cause of the disease appears to be physiological. It is related in some way to the transpiration, or the giving off of water. Consequently, anything that affects transpiration affects the disease. Chief



Fig. 5.—Blossom-end rot in well advanced stage showing characteristic development. (After H. P. Stuckey, Ga. Expt. Sta. Bul. 112, 1915).

of these appear to be soil moisture, sunlight, and fertilizers.

The soil moisture should be as uniform as possible. Excessive moisture or drought appears to induce the disease. Where it is possible to irrigate small gardens, it has been found that, by providing sufficient moisture as uniformly

throughout the season as possible, little blossom-end rot develops. Where excessive moisture is likely to result, good drainage should be provided.

Sunlight affects transpiration very markedly and consequently affects the disease. It has been found that strong, direct sunlight tends to induce blossom-end rot. A comparison of strong, direct sunlight and diffused weaker sunlight may be had from tomatoes that mature and ripen in midsummer, when heavy losses from blossom-end rot occur, and those which mature in the late fall when, as a rule, very little of the disease is present. A practical method of partly eliminating this source of the disease is the thick planting of the vines so as to create as much shade as possible. In



Fig. 6.—Cross section of tomatoes with blossom-end rot. (After H. P. Stuckey, Ga. Expt. Sta. Bul. 112, 1915.)

drier climates, it is recommended that the vines should not be staked, since this tends to expose the tomatoes to the sunlight. For Mississippi conditions, however, it is not recommended that tomatoes be left unstaked, since the heavy rainfall of this section would cause serious loss from ground rot, or soft rot, if the tomatoes were on the ground.

Excessive pruning should not be practiced as this tends to remove the shade from the tomatoes.

The question of fertilizer is a much debated one. It appears, however, that a well balanced fertilizer is essential in keeping down the disease. An unbalanced fertilizer appears to induce the disease. This seems particularly true in the case of excessive amounts of potash and nitrogen. Some authorities also claim that very heavy applications of stable manure should be avoided.

*Control.* The known control measures then may be summarized as follows:

1. Keep soil moisture as uniform as possible by good drainage and by irrigation where facilities are to be had.
2. Plant thickly in the field so as to induce as much shading as possible. In certain cases, particularly in greenhouses, artificial shading may be done.
3. Use a balanced fertilizer. Do not have an excess of potash, or nitrogen, nor make unusually heavy applications of stable manure.
4. Do not prune more than is necessary as pruning reduces the shade of the plants.

### Wilt

Tomato wilt, which is frequently erroneously referred to as "blight," is doubtless the most important parasitic disease in the State, and appears to be prevalent in varying amounts in almost every county in the State. According to the records of the Plant Disease Survey of the United States Department of Agriculture, this troublesome disease of tomatoes is not only prevalent in every Southern State, but it has been reported as causing serious loss in canning sections, such as Ohio, California, Colorado, Indiana, and New Jersey. In the Middle Atlantic, Gulf, and Lower Mississippi Valley States, careful estimates place the annual loss from tomato wilt at 115,000 tons of tomatoes. It seems to be scattered all over the world, more abundant in the warmer regions, but present to some extent in the more northerly sections. Besides the northern and western states men-

tioned above, it has been found as far north as Michigan and Massachusetts. In Mississippi, the annual loss caused by this disease is conservatively estimated to be fully 25 per cent.

*Symptoms.* Tomato wilt may attack the plants at all stages of development. Seedlings grown in flats, or in hotbeds frequently become infected and killed by wilt, especially if the soil used is taken from a garden or portion of a field that is infested by the disease. Such soil is usually rich in organic matter and the fungus multiplies rapidly and soon invades the roots of the young seedlings. Infected seedlings may appear healthy and, after transplanting, may grow for a week or ten days before any diseased condition is noticeable. Finally, their growth is retarded and it becomes an easy matter to pick out plants that are affected by wilt from healthy ones. The disease usually becomes noticeable on plants in the field when they commence blooming, or when the first fruit clusters begin to ripen. At first the lower leaves of the plants turn yellow, and roll slightly inward. This is accompanied by a more or less stunted, or sickly appearance. As the disease progresses, more of the leaves turn yellow and fall off and finally the whole plant wilts. (Figure 7.) The appearance of the disease in plants which are approaching maturity is explained by the fact that, at this stage of growth, the plant draws heavily on the roots and conducting system for water. The fungus, however, by invading the roots, clogs the water conducting passages and wilting becomes evident. Frequently a plant that becomes infected by wilt reasonably late in the season may ripen a few good fruits, but, if it is attacked before the fruits attain much size, they seldom ripen into first grade tomatoes.

If a plant that is affected with the wilt disease is pulled up and cut in cross-section, the veins and woody tissues will be dark brown in color (Figure 8) and, in advanced cases, this dark brown discoloration can be traced from the roots to the leaves that have turned yellow or died. Briefly stated, wilt symptoms are yellow lower leaves, stunted growth of the plant, and a dark brown discoloration of the inside

tissues of the stems and roots. These abnormalities hold true with all *Fusarium* wilt diseases, regardless of the species, or host involved.

*Cause of the Disease.* Tomato wilt is caused by a microscopic fungus known as *Fusarium lycopersici* (Sacc.) This species is very closely related to the one which causes cotton wilt and the dark discoloration in the stems and roots, referred to above, is also present in the case of wilt-infected cotton plants. The two diseases are distinct however, since the tomato wilt species of *Fusarium* will not infect cotton and *vice versa*. The fungus lives in the soil saprophytically on dead organic matter. It is capable of living in this condition for several years, and when plants are put into such wilt-infested soil, this fungus becomes actively parasitic by invading the roots, growing up through them and into the stems. After entering the water-conducting vessels of the plant, the mycelium, or vegetable growth, of the fungus develops rapidly, forming an impervious mat which prevents the passage of water. The result is a wilting, and finally, death of the plant. After the plant dies, the fungus grows out on the stems and roots, forming a pinkish mildew-like growth and at this stage spore production takes place in great abundance.

*Control of Wilt.* Since the cause of wilt is a fungus which can live for several years in the soil after it becomes infested, control measures must consist of (1) keeping the disease out of gardens and fields that are not infested, (2) the rotation of crops, or (3) the development of strains which are resistant to the disease. Frequently, the home gardener can rotate his vegetables so that new ground can be found each season for the tomato crop. A long rotation, however, under field conditions does not appear to offer much encouragement as an eradication measure, since it is definitely known that the tomato *Fusarium* and related species will remain viable from four to six years in many types of soil. As the disease is one that is confined to the soil, and its attack and development on the plant is entirely internal, it is obvious that spraying, or the usual fungicidal preventive treatments, will have no effect in controlling it. Un-

doubtedly, the only logical method of controlling wilt is through the development of resistant varieties.

*Development of Resistant Varieties.* Pioneer work on the control of wilt diseases of various field and vegetable

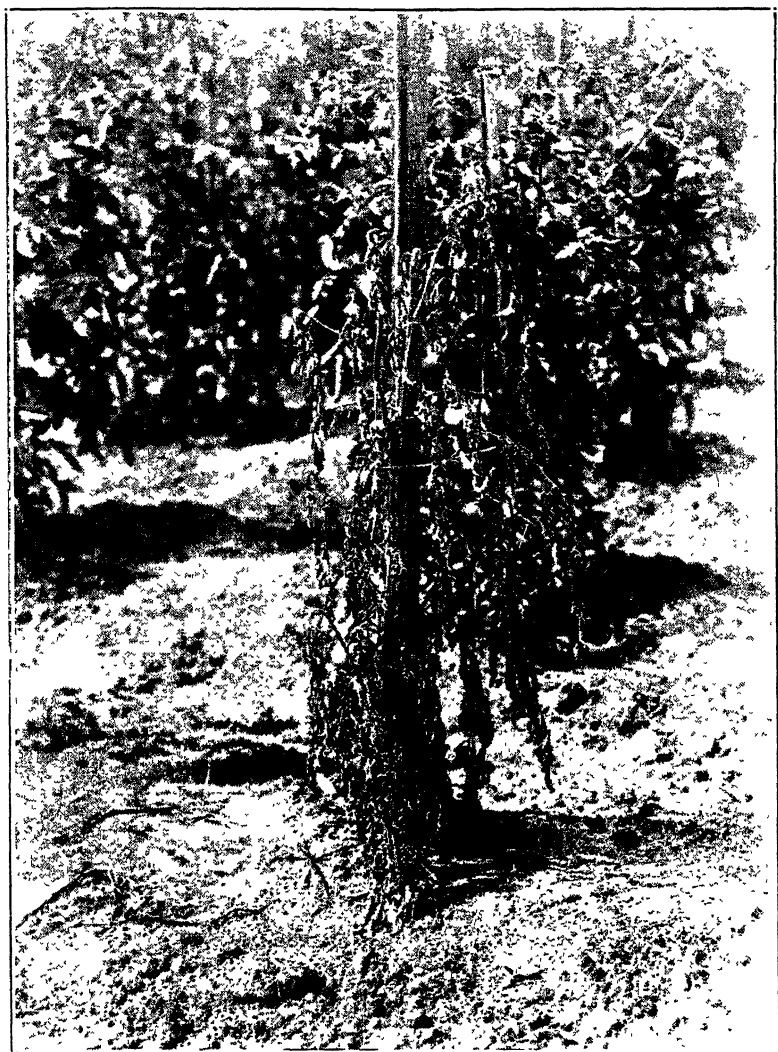


Fig. 7.—A tomato plant killed by the wilt disease. The fruit was two-thirds mature when this plant was attacked by the fungus.

crops has been done by a number of investigators. Among these might be mentioned W. A. Orton of the U. S. Department of Agriculture, who was one of the first investigators to obtain results in plant disease control, through resistance, by continued selection. His earlier work dealt largely with the wilt disease of cotton, cowpeas, and watermelons. Bolly of the North Dakota Station was successful also in developing wilt resistant varieties of flax, and Jones and Gillman, and their associates at the Wisconsin Station have made considerable progress in obtaining cabbage varieties resistant to yellows, another wilt fungus. Recent work on developing wilt resistant varieties of tomatoes has been carried forward by various state experiment stations, as well as by the U. S. Department of Agriculture. Important contributions have been made by Pritchard of the U. S. Department of Agriculture, Edgerton of the Louisiana Experiment Station, Essary of the Tennessee Experiment Station, and by Humbert of the Ohio Experiment Station.

*Wilt Resistant Tomato Varieties.* Among some of the more promising wilt resistant varieties of tomatoes, which have been developed during the past few years are the Norton, the Marvel, the Norduke, the Columbia, the Louisiana Red, and the Louisiana Pink. Most of these varieties have been tested in Mississippi by the Experiment Stations over a period of years and the results, both as to resistance to disease and yields, have been very satisfactory.

The Norton is a selection from the Stone and was developed by Mr. J. B. S. Norton of Maryland and later improved by the U. S. Department of Agriculture. This variety produces a heavy yield of large, smooth, solid red fruit, which ripens slowly and therefore ships well. It is highly resistant to wilt, and is an excellent tomato for canning, for home gardening, and for late trucking.

The Marvel is a selection from Merveille des Marches (Marvel of the Market), a French variety sold by Vilmorin-Andrieux and Company, Paris, France. This variety was later improved by Pritchard of the U. S. Department of Agriculture. It is an excellent variety for medium early

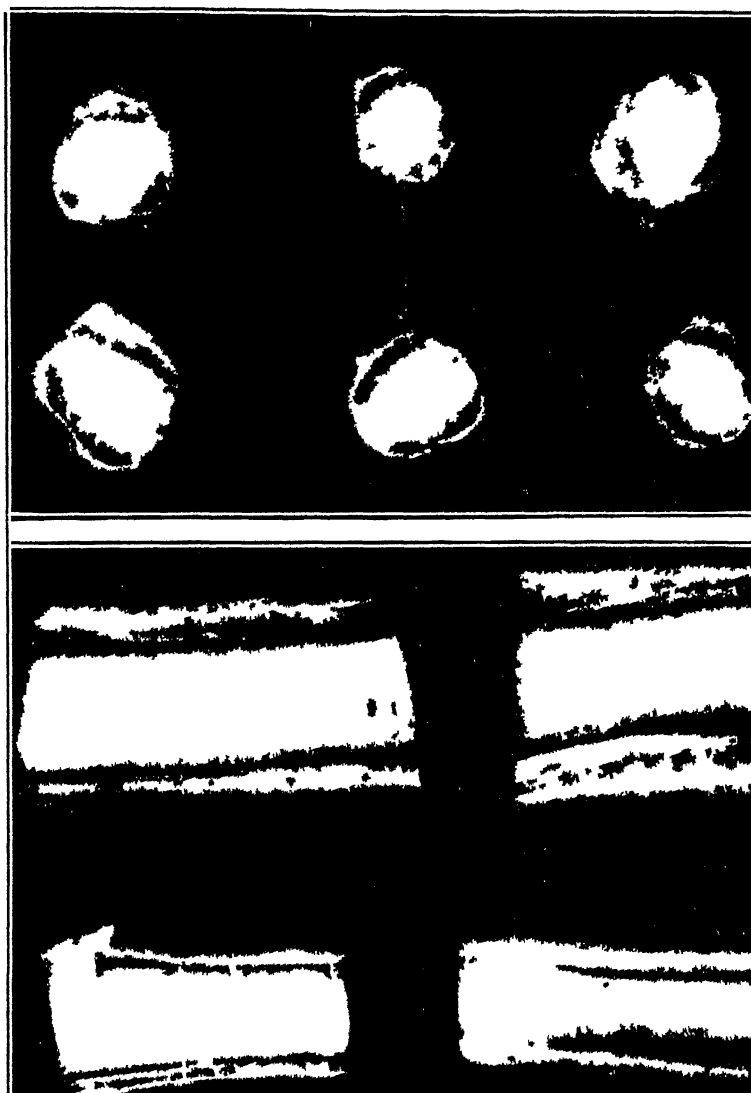


Fig 8—Cross and longitudinal sections of wilt-infected tomato stems. Note the dark brown wilt-infected areas between the pith and the bark (After Fred J. Pritchard, U. S. Department of Agriculture, Bulletin 1015, 1922.)



truckling, producing medium-early, smooth, red fruit. It is highly resistant to wilt and possesses some resistance to tomato leaf-mold and leaf-spot.

The Norduke, introduced by Pritchard of the U. S. Department of Agriculture, is the most resistant variety to wilt that has yet been tested by the Mississippi Experiment Stations. The fruit characters of this tomato are similar to the Norton, but it does not yield as well as the latter.

The Columbia is a selection from Greater Baltimore and, like the parent variety, produces a heavy crop of large, smooth, deep-red fruit, which ripens uniformly; in fact, it is practically free from green tissue around the stem by the time the blossom end is ripe, but it ripens so fast that it can not be held long. It is highly resistant to tomato wilt.

The Louisiana Red and the Louisiana Pink are hybrids, which have been developed by Edgerton of the Louisiana Station. These are crosses between Earliana and Acme. These varieties are very resistant to tomato wilt and are doubtless as prolific as any of the other wilt resistant tomatoes.

The State Plant Board and the Experiment Stations grew co-operatively during 1923 about forty pounds of Marvel and Norton tomato seed. These were distributed, gratis, this season, in small quantities, to people throughout the State for trial planting. Approximately five thousand packets of seed have been distributed during the past sixty days, and it is believed that the losses encountered heretofore from wilt can be materially reduced by using these selected varieties, and by giving some attention to the control of early blight, or leaf spot, as discussed in this paper.

## ARSENICALS FOR THE TOMATO FRUIT WORM

(By R. C. Price.)

The Tomato Fruit Worm, *Heliothis obsoleta*, known also as the cotton bollworm and corn earworm, often proves to be a serious pest to the Mississippi truck grower. This is

especially true with early tomatoes, as there are no other host crops ready at that time for the worms to feed on. An early planting of tomatoes here on the Poplarville Branch Experiment Station was practically destroyed last year by this pest due to the fact that there were no other host crops sufficiently advanced to prove attractive.

Just as a test of some of the measures usually advised for this pest, three plats, cultivated and fertilized in the same manner, were treated as shown below:

PLAT	TREATMENT	PERCENTAGE OF INFESTED FRUITS
No. 1.	Dusted with calcium arsenate on June 5, 14, and 30th.-----	%2.48
No. 2.	Sprayed June 2, with 4-4-50 Bor- deaux mixture, plus 1 pound lead arsenate.	
	Sprayed June 14, with 4-4-50 Bordeaux plus 2 lbs. lime and 2 lbs. lead arsenate.	
	Sprayed June 30, with 2 lbs. lime and 2 lbs. lead arsenate in 50 gallons water -----	%1.5
No. 3.	Check (No treatment)-----	%11.5

Since there were from five to seven times as many wormy fruits in the check plat as in the treated plats, there is no question that the dusting and spraying paid well. If Early Blight is serious, spraying with Bordeaux Mixture, plus a pound of powdered lead arsenate, will give the best results, though dusting with calcium arsenate is easier and practically as effective when no fungicide is needed. Applications should start as soon as the first injury is noted and be continued at intervals of a week or 10 days. To prevent any possible chance of poisoning the consumer, poison applications should be discontinued about two weeks before picking starts.

The dust or spray advised above will also control the big green tomato hornworm, and tend to keep in check the hordes of blister beetles that sometimes attack tomatoes.

## CONTROLLING MELON PESTS

(By Clay Lyle)

Judging from thousands of complaints received from farmers all over Mississippi, there is no doubt that the two most serious pests of melons and canteloupes in this state are the striped cucumber beetle, or "watermelon bug," as it is often called, and the pickle worm which causes so much loss by boring into cucumbers, canteloupes, and squashes. While watermelon anthracnose causes a great deal of damage in the State, the number of growers complaining of the two insect pests is far greater. With the hope of helping as many farmers as possible fight these pests this summer, this brief article gives only the simplest effective control measures, using materials that are most easily secured by the average Mississippi farmer.

### The Striped Cucumber Beetle.

(*Diabrotica vittata*)

This small, yellow-and-black striped beetle is too well known to Mississippi farmers to require a description. Hundreds of them can usually be found in a melon field from the time the plants first push through the soil until the melons are ripe, and in heavily-infested fields ripe melons are often attacked, leaving large white areas on the rinds.

Experiments by the U. S. Bureau of Entomology and several state experiment stations indicate that nicotine dust, containing from 6% to 10% of nicotine sulphate, is the most promising poison for this pest at present. However, a great many local drug stores in Mississippi do not sell nicotine sulphate, so a poison more easily secured is advised instead. The most effective measure tried at the South Mississippi Experiment Station last year was a dust made by mixing 1 pound of powdered lead arsenate with 15 pounds slaked lime.

The lead arsenate can be secured at nearly any drug store in the State, and, mixed with the slaked lime, makes a very cheap and effective control measure. The plants should be kept well-covered with the dust at all times, beginning as soon as they are above ground and continuing the applications weekly as long as the beetles are present in injurious numbers. If an application is washed off by rain while the beetles are numerous it should be repeated at once. The poison may be applied with a hand dusting gun or shaken from a cheesecloth sack. If lead arsenate is not available, calcium arsenate as used for dusting cotton, may be substituted, though it has been found slightly less effective in some cases.

Where anthracnose is likely to be serious in a melon field, this disease and the cucumber beetles may be combatted at the same time, spraying with a 4-4-50 Bordeaux Mixture, plus 1 pound powdered lead arsenate in each 50 gallons. Several applications at intervals of a week or ten days may be required to control both the anthracnose and the beetles.

More detailed information about this pest, and other control measures for it, may be found in Farmers' Bulletin No. 1322, "The Striped Cucumber Beetle," and No. 1282, "Nicotine Dust For Control of Truck Crop Insects." These bulletins may be secured from the U. S. Department of Agriculture, Washington, D. C.

### The Pickle Worm

(*Diaphania nitidalis*.)

Hundreds of farmers and truck growers in Mississippi complain of this worm ruining canteloupes, cucumbers, and squashes every year. The adult form is a small moth which usually lays eggs on the outside of the unopened flower buds. When hatched the young larvae burrow into the flower buds and destroy them, sometimes going down the stem for short distances. When about half-grown, the worms attack the fruits themselves, tunneling through and destroying them.

Sometimes the eggs are laid in the tender leaves of the growing point, in which case the worms feed for a short time on the leaves before entering the fruit. The eggs are also sometimes placed on the under side of the fruit, and in such cases the young worms do not feed on the leaves at all. When full grown the larva changes to the pupa or resting stage among the leaves on the ground, from which the adult moth emerges in about a week or ten days in summer. The last generation passes the winter in this stage and the adults emerge in the spring.

*Control Measures.* Poisons sprayed or dusted on the plants have not proved successful against the pickle worm because most of the feeding is done inside the fruit. Since the moths prefer to lay their eggs on squashes rather than on other plants, squashes are used as a trap crop to attract the moths away from cucumbers and canteloupes. It is advisable to have four to eight rows of summer squashes well distributed over each acre of canteloupes or cucumbers, planting them at different times so as to provide a succession of blooms and squashes during the time the fruit is being produced on the other crop. The first planting of squashes should be made at the same time as the other crop, with about two other plantings at intervals of ten days. Alternate hills on the squash rows may be planted first, then ten days later plant the other hills. A third planting may be made ten days after the second in the skips in the cucumber or canteloupe rows. As soon as the squash vines and fruit are thoroughly infested and before the worms are fully grown, the vines should be pulled up and burned. Unless this is done before the worms leave the fruits and go into the ground to pupate, the trap crop will be harmful instead of useful.

Using squash as a trap crop is the best measure known for fighting this pest. However, it should be used in connection with crop rotation, for since the pickle worm pupae spend the winter covered by dead leaves or in the upper soil, it is very important not to have the cucumbers, squashes or canteloupes on the same ground two years in succession, or succeeding one another. This rotation is also important

on account of fungous and bacterial diseases that might remain in the soil from one year to the next.

### **Watermelon Anthracnose** (*Colletotrichum lagenarium*)

This is an important disease of melons in Mississippi, attacking the vines and causing them to shrivel and die before the melons are mature, and also spotting the melons with rotting "pock mark" depressions. It may be carried on the seed or may remain over winter in the soil. Soaking the seed 5 minutes in a 1 to 1000 solution of bichloride of mercury, and rotating the watermelon field, will help control the disease.

However, the most important control measure is spraying the vines with 4-4-50 Bordeaux Mixture. The disease spreads rapidly during and immediately after rainy weather, consequently the spraying should be timed according to the weather. As a general guide though, the following schedule may be used:

Make the first application when the vines begin to run.

Spray the second time about one week after the first melons have "set" on the vines.

Make a third application about two weeks after the second.

If there is much rain during the ripening period, other applications may be profitable.

More detailed information on anthracnose and other watermelon diseases may be found in Farmers' Bulletin No. 1277, "Diseases of Watermelons," which may be obtained from the Department of Agriculture, Washington, D. C. An illustrated article on watermelon anthracnose also appeared in the April, 1923, issue of this Bulletin.

### **MEXICAN BEAN BEETLE DISTRIBUTION, 1923.**

All Mississippi farmers will be interested in securing accurate information about the spread of the Mexican Bean Beetle since its first discovery in Alabama in 1920, as shown

on the accompanying map furnished through courtesy of the United States Bureau of Entomology. Though the bean beetle was found in Mississippi last year on only thirteen farms in Itawamba and Tishomingo Counties, many unfounded rumors have been circulated about its presence in other sections of the State. A study of the map will show that, fortunately for the farmers of Mississippi the bean beetle is spreading westward very slowly, as only two small advances were made in 1923. At this rate it may be several years before the greater part of the State will become infested.

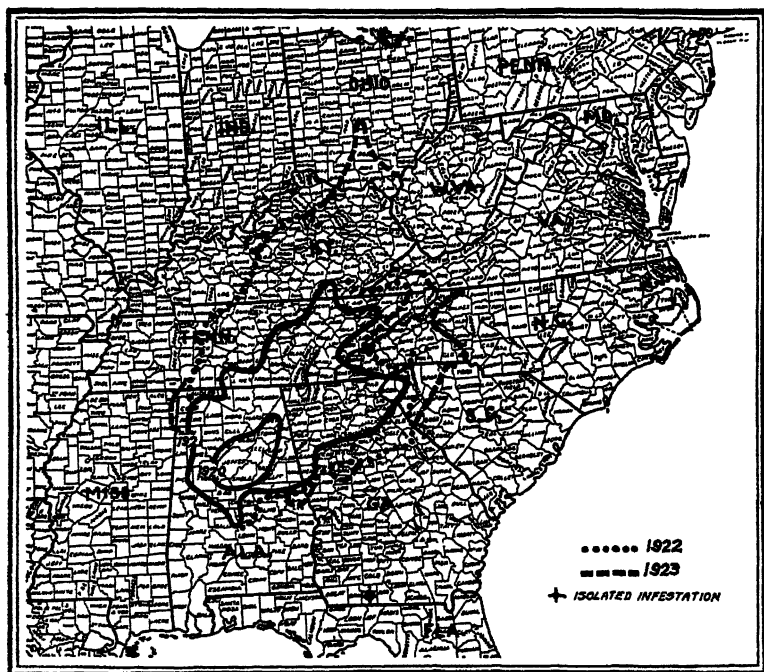


Fig. 9.—Distribution of Mexican Bean Beetle in Eastern United States.

However, the beetle is moving northward with a rapidity that is alarming the commercial bean sections of New York and Michigan. During 1923 it advanced into Ohio about 150 miles north of the most northern infestation recorded

in Kentucky in 1922. Since its discovery in 1920, the advance northward has been more than ten times as great as the movement westward. It has also spread eastward considerably, at one point in North Carolina moving over 100 miles last year. A marked eastward advance was also made in South Carolina last year, and the same is probably true of Virginia and West Virginia, though no information is available about the exact limits of spread in these two states, as the scouting force of the Bureau was inadequate for so much territory. The spread southward has been negligible, as only two minor instances were recorded during 1923.

The Plant Board will continue scouting for the bean beetle as opportunities occur, and will endeavor to keep in touch with owners of infested farms and advise them regarding the most satisfactory control measures recommended by the Bureau of Entomology. Farmers in the eastern part of Mississippi especially, are urged to be on the lookout for this small yellowish-brown ladybird beetle with eight black spots on each wing cover, or for the bright yellow larvae and masses of eggs on the under sides of the leaves. All specimens of insects attacking beans and peas should be sent to the State Plant Board, A. & M. College, Miss.

## FALL WEBWORM CONTROL MEASURES.

*(By J. G. Hester.)*

This insect is known to practically every person in Mississippi on account of the widespread webbing of persimmon, pecan, hickory, walnut, sweet gum, black gum, and many other trees during 1922 and 1923. The name "Fall Webworm" has been a misnomer in Mississippi during the past two years, as moths, egg masses, and larvae have been observed before the end of May. During 1922 it did considerable damage to fruit, shade, and ornamental trees in all parts of the State, with heavier damage perhaps in South Mississippi. Very little parasitism occurred, and as was expected, the moths appeared widespread during May, 1923. More complete destruction was expected than during the previous year, and this proved to be the case south of the



Alabama & Vicksburg Railway, but parasites attacked the first generation in North Mississippi and the subsequent damage was much less than the year before. As it is likely that this pest may again be present in large numbers in some sections of Mississippi during 1924, this article is written with the hope that the control measures suggested herein may be helpful, especially to owners of pecan groves.

Where the proper spraying equipment is available, there is little doubt that the most satisfactory method of control is by spraying with lead arsenate, 1 pound powder to 50 gallons water, plus 5 pounds of slaked lime to prevent burning, and 3 or 4 pounds of soap as a sticker and spreader. This spray should be applied as soon as the egg masses begin hatching, thus poisoning the young caterpillars before much foliage is consumed. Where orchards are sprayed with Bordeaux Mixture for pecan scab, the lead arsenate may be added to the spray and the webworm controlled without additional trouble. Even when a grove is completely cleared of the webs, another spraying may be necessary after the moths of the next generation emerge, as they will fly from nearby trees and woods and deposit eggs.

Where it is impossible to spray before the worms have built large webs, the most effective measure is twisting out the webs and destroying the worms. Singeing or burning the webs in the trees is practiced by many and good results are obtained. A small ball of rags or two or three corn cobs soaked in kerosene and fastened with a wire at the tip of a long bamboo pole makes a better torch and scorches the limbs less than a bundle of newspapers which burn out very quickly.

Good climbers with double-pronged twisting forks can free even a large tree of most of the webs and worms in a few minutes. But unless the webs are being burned as fast as they are thrown from the trees, a large number of the worms will escape and go back up the trees. Many will escape anyhow and climb the tree again. In case of heavy infestation, it will usually pay to paint a sticky band of tanglefoot about an inch wide all around the tree as fast as

the webs are removed. This tanglefoot is made by heating about a pound of rosin and a pint of linseed oil together, adding more rosin if the mixture is too thin to be sticky. In some cases where this tanglefoot band has been used, great masses of worms have collected below the band in just a few hours, showing the importance of using it. The worms in the masses may be destroyed by burning or spraying with kerosene, but even if left alone they will probably remain on the tree trunk until they starve, as in all cases observed they showed no signs of coming down the tree to seek food elsewhere.

### SAVE THE PEACHES NOW.

If you have not already sprayed your peach trees, the curculio is now getting in his deadly work and a harvest of wormy, rotting peaches is sure to be the result unless the damage can be checked at once. There is still time to give some of the most important sprays, so we are here publishing the most recent spray schedule recommended by Mr. O. I. Snapp, Entomologist in charge of the Peach Pest Laboratory at Fort Valley, Georgia, which is the same as was advised in his article printed in this Bulletin a year ago.

“First Application:—When 75% of the petals (pink part of flower) have fallen, use one pound of powdered arsenate of lead, plus limewater from three pounds of unslaked lime, to each 50 gallons of water.

Second Application:—When the calyces, or “shucks” are shedding, exposing the small peaches, which is usually about ten days after the falling of the petals, use the same spray as recommended for the first application.

Third Application:—Two weeks after the second application, or about four weeks after the petals have fallen, use 8-8-50 self-boiled lime-sulphur alone.

Fourth Application:—Four weeks before each variety is due to ripen, use one pound of powdered arsenate of lead to each 50 gallons of 8-8-50 self-boiled lime-sulphur.

Early varieties should be sprayed only three times, using

the materials recommended for the 1st, 2nd, and 4th applications above, applying them at the times noted above. For added protection against brown rot, self-boiled lime-sulphur should also be used in the second application on the early varieties."

Detailed instructions for making self-boiled lime-sulphur and other sprays may be secured by writing the State Plant Board, A. & M. College, Miss.



# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## REPORT OF THE NURSERY INSPECTOR

For the Quarter Ending March 31, 1924.

Number of Nurseries Inspected During Quarter.....	43
Acreage in Nurseries Inspected During Quarter.....	208.84
<b>Amount of Nursery Stock Inspected:</b>	
Grafted and budded pecans .....	13,590
Seedling pecans .....	22,300
	<hr/>
Total pecans .....	35,890
Citrus trifoliata .....	39,000
Orange .....	1,300
	<hr/>
Total citrus .....	40,300

Apple -----	1,000
Pear -----	35,860
Peach -----	500
Fig -----	100
Japanese persimmon -----	1,000
Mulberry -----	50
Strawberry -----	760,000
Miscellaneous fruit -----	275
 Total fruit (citrus excluded) ----	 798,785
 Kudzu -----	 25,000
 Total kudzu -----	 25,000
 Rose -----	 762
Other ornamentals -----	143,850
 Total ornamental -----	 144,612
 Grand total of plants inspected during quarter	 1,044,587

**QUARANTINE INSPECTION REPORT****For Period from January 1 to March 31, 1924.****(By Geo. F. Arnold, Quarantine Inspector)****Ships and vessels inspected:**

From foreign ports -----	13
From U. S. Ports -----	0
<hr/>	
Total -----	13

**Parcels inspected:****Arriving by water:**

Passed -----	0
Treated and passed -----	0
Returned to shipper -----	0
Contraband destroyed -----	0
<hr/>	
Total -----	0

**Arriving by land, express, freight, wagon, etc.:**

Passed -----	738
Treated and passed -----	1
Returned to shipper -----	9
Contraband destroyed -----	12
<hr/>	
Total -----	760

**Arriving by mail:**

Passed -----	686
Treated and Passed -----	21
Returned to shipper -----	0
Contraband destroyed -----	18
<hr/>	
Total -----	725

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**Grand total of parcels inspected ----- 1485**



# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

VOL. 4

JULY, 1924

No. 2

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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# Destructive Insects Mississippi Is Guarding Against

*(By Clay Lyle)*

The entrance of foreign pests into the United States has greatly multiplied the troubles of the farmer. Of the estimated annual loss of \$2,000,000,000.00 in the United States from the ravages of insect pests and plant diseases, by far the greater part is due to imported pests.

Mississippi, in common with other Southern states, bears more of this loss in proportion to her area and population than the more Northern states of the Union, as a result of having a climate favorable to more kinds of insects, and to the more rapid multiplication of each kind. However, Mississippi is fortunate in that many destructive pests which have recently entered other sections of the United States, or occur in foreign countries, are, with few exceptions, not yet within her borders. Among such pests are the pink bollworm of cotton, sweet potato weevil, European corn borer, Japanese beetle, alfalfa weevil, camphor scale, Mediterranean fruit fly, sugar cane moth borer, gipsy moth, brown-tail moth, and Oriental peach moth, any one of which might cause great loss if it should become widely established in the State.

The State Plant Board maintains strict quarantines against these pests, prohibiting the importation of dangerous products from other states and countries where these pests occur, besides scouting for them within the State at every convenient opportunity. In order that the farmers of Mississippi may help the Plant Board look for these pests, the following paragraphs give brief histories and descriptions of them, as well as the appearance and extent of the injury caused by them. The accompanying illustrations

have been secured from various sources, most of them through the courtesy of the United States Bureau of Entomology. While these descriptions and illustrations will help anyone to look for the pests described, nobody should attempt to make determinations unaided, but should send in suspicious specimens at once to the State Plant Board.

### **The Pink Bollworm**

(*Pectinophora gossypiella* Saunders)

The most dangerous crop pest threatening Mississippi at this time is the pink bollworm, regarded as the most serious enemy of cotton. It was already established in India, Egypt, China, and Brazil before it was discovered in Mexico in 1916. It was first found in the United States at several points in Southeastern Texas in the fall of 1917. Other infestations were next found in Southwestern Louisiana and West Texas. In 1920 the pest was discovered at Carlsbad, New Mexico, and also near Shreveport, Louisiana. In 1921 two other Texas counties were found infested—Ellis, the banner cotton county of the United States, and Grayson, on the Oklahoma border. No new infested areas have been discovered since 1921.

State and Federal efforts have been directed toward the eradication of this pest by the use of non-cotton zones. These have been very effective, since the pink bollworm, like the boll weevil, breeds only in cotton. No cotton was planted in the infested areas for two or three years, all volunteer plants were destroyed, and in practically every case the pest has been exterminated. The only known infestations now remaining in the United States are in the extreme western part of Texas and in New Mexico, where it is impracticable to attempt eradication on account of the constant danger of reinfestation from across the Mexican border.

Mississippi has maintained a very effective quarantine against the infested states since March, 1920, prohibiting the entrance of cotton seed, seed cotton, and cotton seed hulls (unless milled by special process).

Cotton fields in every county of the State, besides oil

mills and gins, have also been inspected for the pink bollworm without finding anything suspicious. Photographs, posters, and specimens of the insect and its damage have been shown at fairs and schools in all parts of Mississippi to encourage everybody to be looking for it.

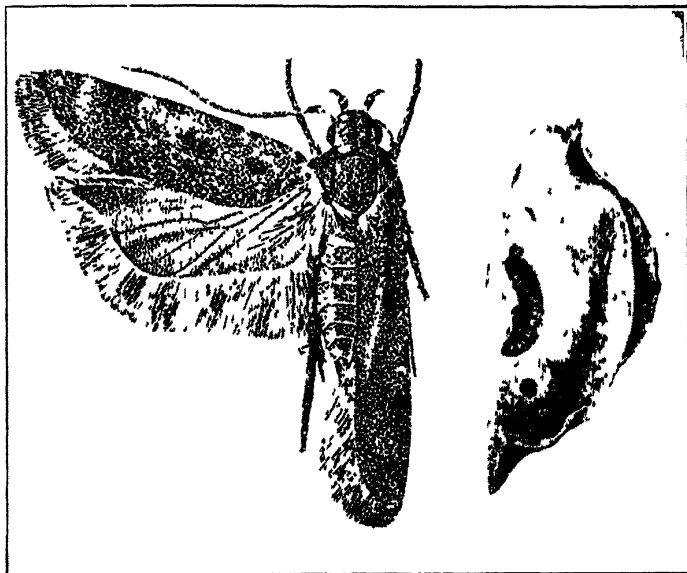


Fig. 1.—Pink bollworm moth, greatly enlarged. At right, pink bollworm on carpel of cotton boll, which shows a typical hole made by worm in going from one lock to the next. (U.S.D.A.)

The adult of the pink bollworm is a small dark brown moth, measuring about three-fifths of an inch across with wings expanded. The larva, or worm, which is the stage most easily found by the farmer, is white, strongly colored with pink on the back, and is almost one-half inch long when full grown. The boll weevil grub is more likely to be mistaken for the pink bollworm than is any other insect. However, the mature pink bollworm is longer and more slenderly cylindrical than the boll weevil larva, besides the pronounced pink color of the former. The work of the pink bollworm in

the boll is also much cleaner and accompanied by less decay and rotting than generally occurs with the boll weevil. The fact that the pink bollworm feeds almost entirely in the seeds will help to distinguish it from other insects that might be mistaken for it, including the cotton bollworm or corn earworm, *Heliothis obsoleta*, and the pink cornworm, *Pyroderces rileyi*. The pink bollworm passes the winter in

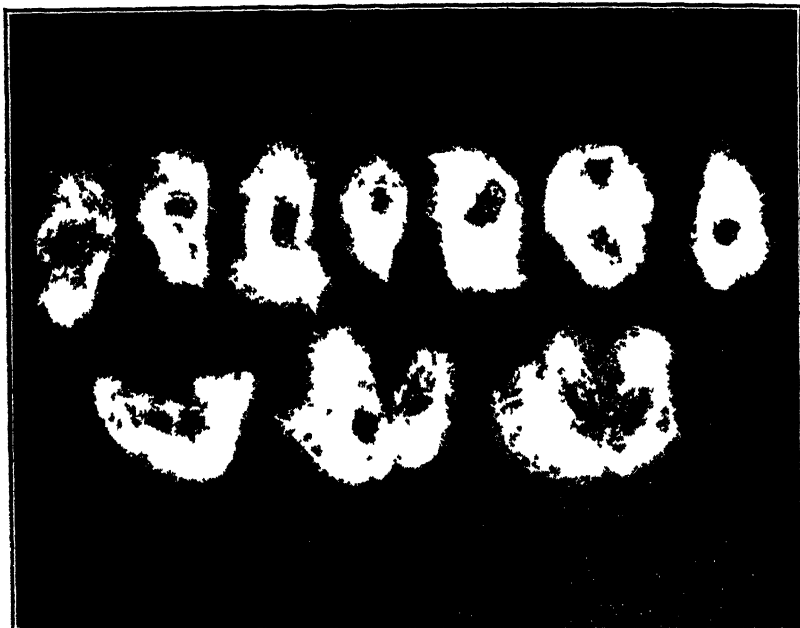


Fig. 2.—Cotton seed infested with pink bollworms. Characteristic double-seeded cells in lower row. (U.S.D.A.)

cotton seeds as a worm, often webbing two seeds together as it grows, to provide sufficient room. Anyone examining cottonseed in gins, oil mills, or seed houses, should look for seed with holes in them, or for these double-seeded cells.

### The Sweet Potato Weevil (*Cylas formicarius* Fab.)

This is the most serious pest of sweet potatoes, the annual loss having been estimated at more than \$3,500,000.00,

though it occurs in only a small part of the belt adapted to this crop. The sweet potato weevil is distributed throughout the world in tropical and semi-tropical countries, and was probably introduced into the United States from Cuba many years ago. It is now found in the southern parts of Florida, Alabama, Mississippi, and Louisiana, and in eastern

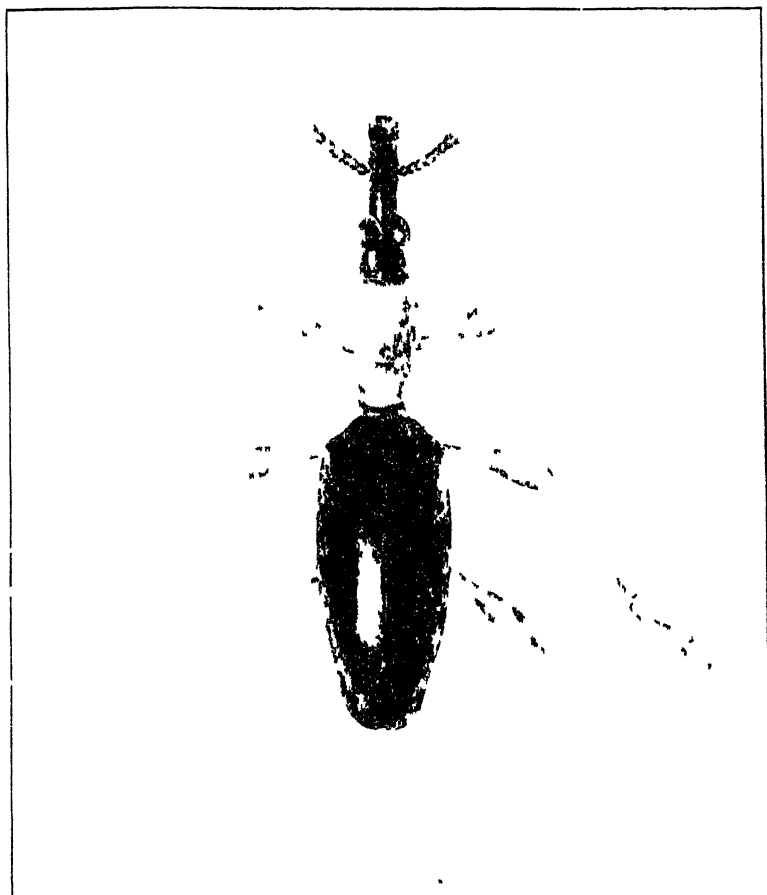


Fig. 3.—Adult sweet potato weevil, greatly enlarged. (U.S.D.A.)

and southern Texas. The infested area in Mississippi covers parts of Jackson, Harrison, Hancock, and Pearl River Counties. It has also been found in the southern part of George

County and at Natchez, but these infestations have been apparently eradicated. Considerable damage has been caused in the counties now infested. In several cases, large fields of potatoes have been abandoned because of this pest. Hogs turned in to eat the potatoes, usually refuse to touch them on account of their bitter taste.

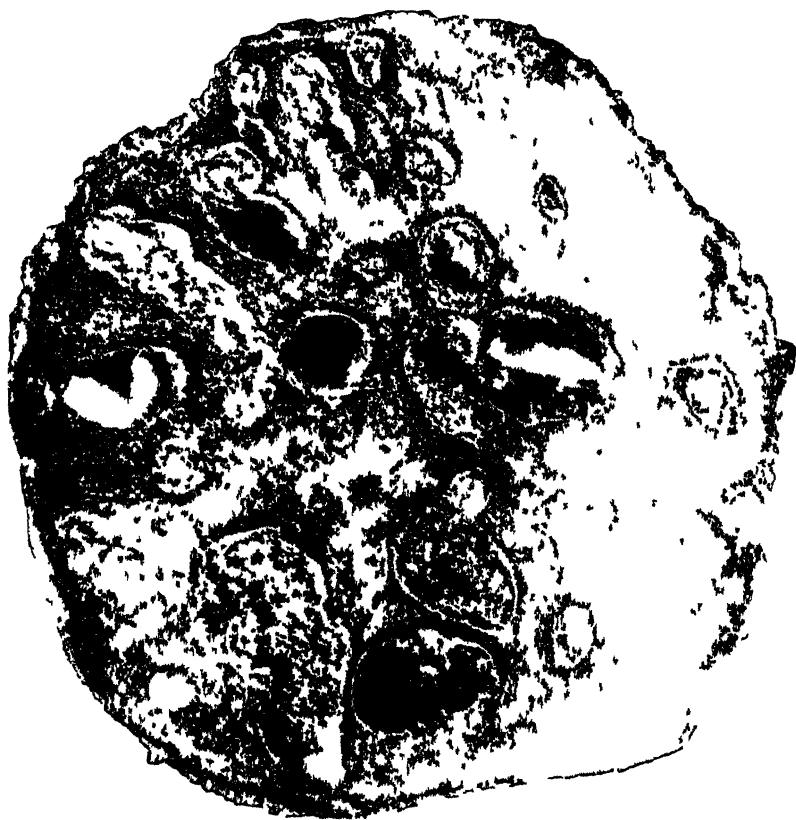


Fig. 4.—Cross section of potato injured by the sweet potato weevil, showing larvae and pupae of the weevil. Greatly enlarged. (U.S.D.A.)

The adult sweet potato weevil is a snout beetle about one-fourth inch long, resembling an ant very much. It has shiny steel-blue wing covers, with the head and beak of the same color. The thorax or middle part of the body, as well as the

legs and antennae or "feelers," are red. The larva or grub is cylindrical, from  $1\frac{1}{4}$  to  $3\frac{1}{8}$  inch long, of grayish-white color, with a brown head. The pupa or resting stage is white at first, but grows darker before changing to the adult weevil. The eggs are small and would not be noticed by the casual observer, as they are deposited in the tubers and vines. All stages of the weevil may be found in potato tubers and in the enlarged crowns of the plants. The tips of tubers that project above the ground are especially liable to weevil injury.

In looking for the weevil in the bank or storage house, any tuber with tiny holes in it would be regarded as suspicious, though one type of this injury is often attributed by growers to termites or "woodlice." However, holes of this type are rarely more than skin deep and contain nothing, while weevil tunnels often go deep into the potato, and slicing usually reveals grubs and adult weevils on the inside. When small grubs or worms are found in healthy, sound potatoes, they are almost certain to be larvae of the sweet potato weevil. The larva of the coffee bean weevil somewhat resembles the sweet potato weevil larva, but it is almost invariably found in dry, dead tissue, or in badly rotting potatoes. However, it will always be well to send any potato containing small worms to the Plant Board for determination.

Every effort is being made to prevent the weevils from spreading to the rest of the State, while at the same time attempting to eradicate them from the four infested counties. A strict quarantine prohibits the shipment of sweet potatoes and potato plants from the infested sections to the rest of the State. This quarantine also applies to the infested parts of other states. Probably the greatest danger of spreading the pest is in the possibility that infested potatoes or plants may be innocently carried to various parts of the State by people making automobile visits to friends or relatives in the four counties where the weevils are now present. To discourage such practices, a great deal of publicity has been given this pest through exhibits and lectures at fairs, schools, and other public places.



**The European Corn Borer**  
(*Pyrausta nubilalis* Hubner).

This pest was first found in the United States near Boston in 1917, and since that time has become established over several thousand square miles of territory in the Northern and Northeastern States. It is now known to occur in Maine,



Fig 5.—Adults, or moths, of the European corn borer: At left, female moth; at right, male moth. Not quite twice natural size. (U.S.D.A.)

New Hampshire, Vermont, Massachusetts, Rhode Island, New York, Ohio, Pennsylvania, and Michigan, as well as in a large area in Canada. It was probably brought into this country from Europe in shipments of broom corn before the passage of the Plant Quarantine Act in 1912. The European corn borer is regarded as one of the most serious pests of this country. Corn is its chief food plant, but it is known to attack 185 different plants, including such important crops as cotton, cowpeas, soybeans, oats, sorghum,



Fig. 6.—Broken corn tassel showing injury caused by larvae of the European corn borer. (U.S.D.A.)

tobacco, sweet clover, Johnson grass, beans, potatoes, and other crops. The injury to corn is caused by the larvae or borers tunneling in the stalks and ears. They also tunnel in the tassel and cob, feed on the leaf blades, silks, husks of the ear, and practically all parts of the plant. In most other plants attacked, the chief damage is by the borers tunneling in the stems and stalks. No very satisfactory control measures have been employed.

There are two generations a year in the Northeastern States, and it is quite probable that there would be four or more with the milder climatic conditions of Mississippi. The adults or moths are brownish-colored and about one inch from tip to tip of expanded wings. The eggs are deposited in clusters on the underside of the leaves of the host plants. Single moths have been observed to lay nearly 2000 eggs, but the average is much lower. The full-grown larva is about



Fig. 7.—Longitudinal section of stalk showing tunnels of larvae of the European corn borer therein. (U.S.D.A.)

an inch long and one-eighth inch thick, with a brown or black head. The color of the body varies from brown to pink, with rows of brown spots on the back. The larva passes the winter in corn stalks or other host plants in the field.

There are three insects in Mississippi more likely to be mistaken for the European corn borer than any others. One is the corn earworm, *Heliothis obsoleta*, which is commonly known as the "roasting ear worm." The damage is somewhat similar to that of the corn borer, but the earworm feeds almost entirely on the silk and kernel of the ear, while the corn borer also bores into the cob, even tunneling through the pith. The corn earworm does not usually tunnel in the stalks or in the tassels, while both kinds of injury are typical of the corn borer. In fact, inspectors scouting for the corn borer look for broken tassels that have been tunneled as one of the chief characteristics of its injury. The full-grown corn earworm is also longer,



Fig. 8.—Bottle containing European corn borers. Collected from one hill containing four stalks of corn; 311 borers. (U.S.D.A.)

inspectors scouting for the corn borer look for broken tassels that have been tunneled as one of the chief characteristics of its injury. The full-grown corn earworm is also longer,

nearly twice as large, and much more variable in color than the corn borer.

Another insect found in Mississippi which might be mistaken for the European corn borer on account of its habit of tunneling in cornstalks, is the larger corn stalk-borer, *Diatraea zeacolella*. However, this insect does not bore in the ears of corn, and also winters only in the rootstock or stubble of corn, while the European corn borer feeds and hibernates almost anywhere, as previously stated. Another Mississippi insect, the sugar cane moth borer, *Diatraea saccharalis crambidoides*, causes injury to corn that might be confused with that of the European corn borer, but this pest is found only in the southernmost counties of the State at this time and it is not likely that many will mistake it for the corn borer.

With the strict Federal quarantine on the infested areas, together with the Mississippi quarantine prohibiting any shipments that might be considered dangerous, the chance of the corn borer reaching Mississippi by commercial spread is rather slight. The chief danger to our State and to other Mississippi Valley states is from the infestation in Michigan and Ohio. It will doubtless be only a short time before the country around the headwaters of the Ohio and Mississippi Rivers will be infested, and since the corn borer larva has been known to remain alive for long periods under water, it will easily be possible for infested cornstalks and other floating debris to scatter the pest all along the courses of these rivers.

### The Japanese Beetle

(*Popillia japonica* Newm.)

From all indications at present, the Japanese Beetle is one of the most serious pests ever brought to the United States. It was first discovered in Burlington County, New Jersey, in 1916, and has since been spreading rapidly. It now covers a large area in New Jersey and Pennsylvania, and has practically reached the state line of Delaware.

The adult Japanese beetle feeds on a wide range of plants, having been found on more than 200 species. Among its most favored food plants are nearly all orchard fruits, a

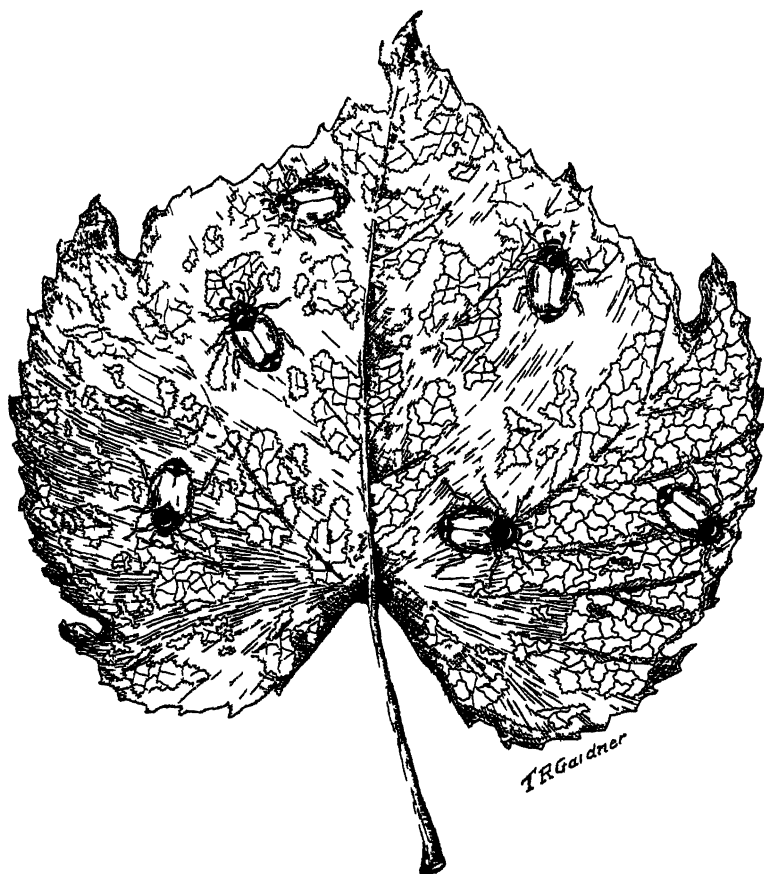


Fig 9—Japanese beetles feeding on grape leaf, natural size. (U S D A)

large number of truck crops, such field crops as corn, soybeans, and red clover, and a great host of ornamental plants and shade trees. The enormous numbers of the beetles and their gregarious habit of feeding result in great damage to crops that are attacked. Fruits such as apples, cherries,

grapes, and peaches may be eaten so badly as to be unrecognizable. In severe infestations gallons of beetles are shaken from fruit trees and destroyed without noticeable reduction in their numbers. In one instance, 208 gallons of beetles were collected from 156 peach trees in less than 2 hours, yet the next morning they were as numerous as before. Lawns, pastures, and golf courses are also seriously injured by the



Fig. 10.—Apples destroyed by Japanese beetles. (U.S.D.A.)

grub stage of the beetle, which is spent in the soil. As many as 1500 grubs have been found in a square yard of soil. No very satisfactory control measures have been found, and it is already evident that any such measures are likely to be very expensive.

The adult Japanese beetle is a beautiful insect about the size of the Colorado potato beetle, with head and thorax of shining bronz-green, and wing covers of reddish-brown. There are very few insects in Mississippi which are likely to be mistaken for it. No description of the grub is necessary, as it is so nearly like other white grubs that occur in Mississippi that only an entomologist could distinguish them.

The State Plant Board maintains a quarantine against all products coming from the infested areas that might carry any stage of this pest. As there is a great danger that the grubs might be in the soil about the roots of fruit trees or other plants, the Plant Board requires that all plants entering Mississippi from those states shall have the soil washed from the roots, and from the limited areas where the beetles are present, no plant shipments are allowed to enter the State at all. This regulation has been criticized by some plant purchasers in Mississippi, but the Plant Board has been firm in enforcing the quarantine, feeling that it could not afford to jeopardize the agricultural and horticultural interests of the State in order to allow one or two individuals to gratify their desires for certain kinds of flowers.

### The Alfalfa Weevil

(*Phytonomus posticus* Fab.)

This is a pest which might cause serious loss to alfalfa growers in the Delta and in the Northeast Prairie section of Mississippi if it should ever become established here. It was first found in the United States in 1904 near Salt Lake City, Utah, having been introduced from Europe in some unknown manner. It has continued to spread and is now found in Utah, Idaho, Wyoming, Colorado, Nevada, Oregon, and California.

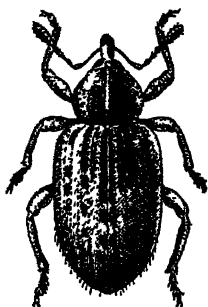


Fig. 11.—Adult alfalfa weevil.  
Greatly enlarged. (U. S. D. A.)



Fig. 12.—Adult alfalfa weevils  
attacking sprig of alfalfa.  
About natural size. (U.S.D.A.)

As the name indicates, the chief food plant of this pest is alfalfa, but it also attacks bur clover, white and yellow sweet clover, red clover, white clover, crimson clover, alsike clover, and other plants. The loss from the injury, which consists of the defoliation of the plants, leaving the stems bare and white, amounts to several million dollars a year in the infested states. Most of the injury is caused by the larval stage of the insect, but the adult beetles also do a great deal of damage. Various control measures have been

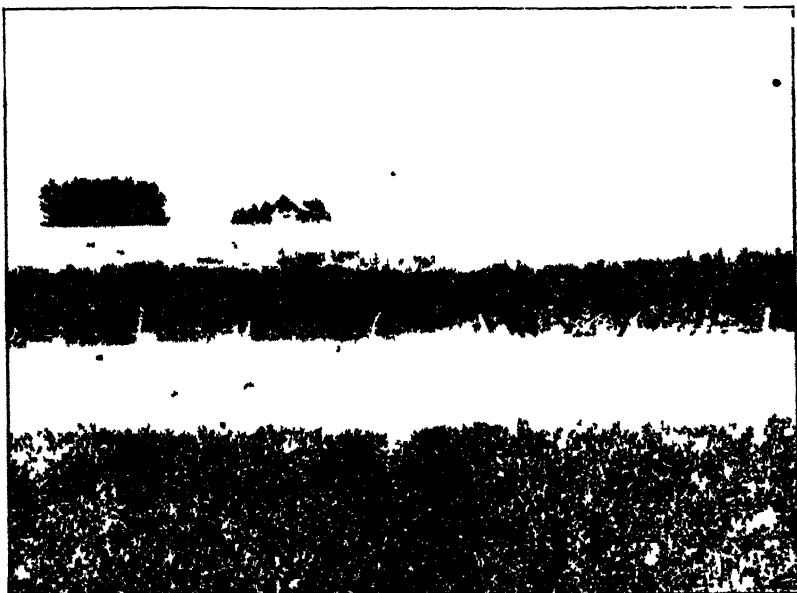


Fig. 13.—Alfalfa saved by spraying. The white strip of bare stubble near the fence was left untreated. (U.S.D.A.)

tried, of which the most satisfactory is spraying with arsenicals.

The alfalfa weevil belongs to the same family as the boll weevil and resembles the latter a good deal in shape and color, though it is only half as large and has a much shorter snout. The larva, which is easier to find than the adult, is a small green worm about one-fourth inch long, with a black head, and a dim white stripe down the back. When numer-



ous in an alfalfa field they cause the tops of the plants to look white on account of the defoliation.

For several years the State Plant Board has maintained a quarantine against the infested states, prohibiting the importation of hay, straw, or other products which might bring any stage of the pest into Mississippi. In order to prevent the re-consignment of hay grown in the infested states into Mississippi from distributing centers in uninfested states, the Plant Board now prohibits the shipment of hay into Mississippi from any source except on permit, and these permits are issued only on receipt of affidavits showing where the hay was grown. With this precaution, the alfalfa weevil should be kept out of Mississippi for many years to come.

### **The Japanese Camphor Scale**

*(Pseudaonidia duplex Ckll.)*

This pest was discovered in New Orleans in 1920, and has since been found in Alabama near Mobile, and in Texas near Houston. Its native home is Japan, and except for the infestations in the United States, it is not known to occur anywhere else in the world. It has been found at several places in Mississippi, but has been promptly eradicated in every instance.

Nearly 200 species of plants are attacked by this insect, including citrus, rose, Japanese persimmon, fig, camphor, and many other fruit and ornamental trees and plants. While not enough is yet known about the camphor scale to make very definite statements about the damage that may be expected, it is already regarded by entomologists as a pest of major importance. The accompanying illustration showing enlarged specimens of the camphor scale, give a better idea of the appearance of the pest than can be gained from a description. Very satisfactory control of the camphor scale has been secured with a lubricating oil emulsion which is now manufactured on a large scale at several places in the South.

Plant shipments into Mississippi from the infested areas are carefully regulated by the Plant Board, and the pest is

not likely to gain entrance in this way. The chief danger is that people residing along the Coast and at other points in South Mississippi, in returning to their homes from New



Fig. 14.—Japanese Camphor Scales. Greatly enlarged. (Dozier.)

Orleans and Mobile, may bring packages of plants in their hands and baggage, thus starting infestations easily. Several infestations along the Coast have been traced to this cause, but were fortunately discovered in time and promptly eradicated.



## The Oriental Peach Moth

(*Grapholitha molesta* Busck\*)

The Oriental peach moth is supposed to have reached the United States from Japan just before the Plant Quarantine Act of 1912 went into force. It is now widely distributed in the Atlantic Coast States, occurring in Virginia, Connecticut, New York, District of Columbia, New Jersey, Delaware, Maryland, and Pennsylvania, with outlying infestations in Georgia, Alabama and Tennessee. It is already doing considerable damage in the commercial peach growing sections. From 5% to 80% infestation of fruit has been reported, the late varieties being injured most. As the name indicates, the principal food plant of the pest is the peach. It also attacks apple, quince, plum, apricot, and cherry trees in varying degrees. Branches as well as fruits are injured. In the early summer the larvae bore into the tender shoots near the tips and eat their way down for several inches, causing wilting and death of the twig, resembling fire blight injury in apples and pears. Later in the season the larvae enter the fruit and destroy it.

The adult Oriental peach moth is grayish-brown in color, and measures about one-half inch across with wings expanded. The larva varies in length and color according to age. The full-grown larva is about one-half inch long and pink, while the smaller ones are gray or white. There are three to four generations a year in the Middle Atlantic States, and it is probable that there will be a greater number in the South. No very satisfactory control measures have yet been devised. Arsenical sprays are useless on account of the larva's peculiar habit of discarding the outside tissues of the fruit or plant, thus avoiding any poison. The most promising control at present is directed against the eggs and small larvae, with nicotine sulphate as the base of the contact spray or dust. However, this adds considerably to the orchardist's expense, as one experiment sta-

\*The names of all Lepidoptera mentioned herein have been approved by Mr. F. H. Benjamin.

tion advises a minimum of seven applications during the growing season.

Orchardists throughout Mississippi should be on the



Fig. 16—Oriental Peach Moth injury on peach twigs and fruit.  
(Courtesy Va. Exp. Sta.)

lookout for any injury that might indicate the presence of this pest, for if discovered promptly, there might be a possibility of eradication, which would be impossible after it became well established.

### **The Sugar Cane Moth Borer**

*(Diatraea saccharalis crambidoides Grt.)*

This is one of the chief sugar cane pests of the world. In the United States its principal damage is in Louisiana, but it also occurs in Florida, Texas, and in seven counties in South Mississippi, including Jackson, Harrison, Hancock, Pearl River, Amite, Wilkinson, and Adams. The infestation in Wilkinson County has been known for several years, while those in the other counties are apparently more recent.

The sugar cane moth borer attacks sugar cane, corn, sorghum, broom corn, Johnson grass, Sudan grass, and other related plants. In Wilkinson County especially, fields of corn have been destroyed, in addition to its injury to sugar cane. In the spring the larva, which is the injurious stage, bores into the inner part of the young corn and cane plants, killing the bud and causing what is known as "dead heart" in sugar cane. Later in the season the borers tunnel through the larger stalks without killing the plant, but reducing the yield from one-sixth to one-third with an ordinary infestation.

The adult is a small straw-colored moth, but is not likely to be noticed. Each female lays about 200 eggs, and as there are 4 to 5 generations in a year, multiplication is very rapid. The larva or borer is about an inch long when grown. The worms pass the winter in stalks of planted cane, in stems of large grasses, in cane stubble, in scraps of cane left after grinding, and in dead cornstalks. The moths emerge in the spring and begin laying eggs on their food plants.

The following control measures have been suggested for Mississippi farmers by Mr. T. E. Holloway, of the Federal Bureau of Entomology:

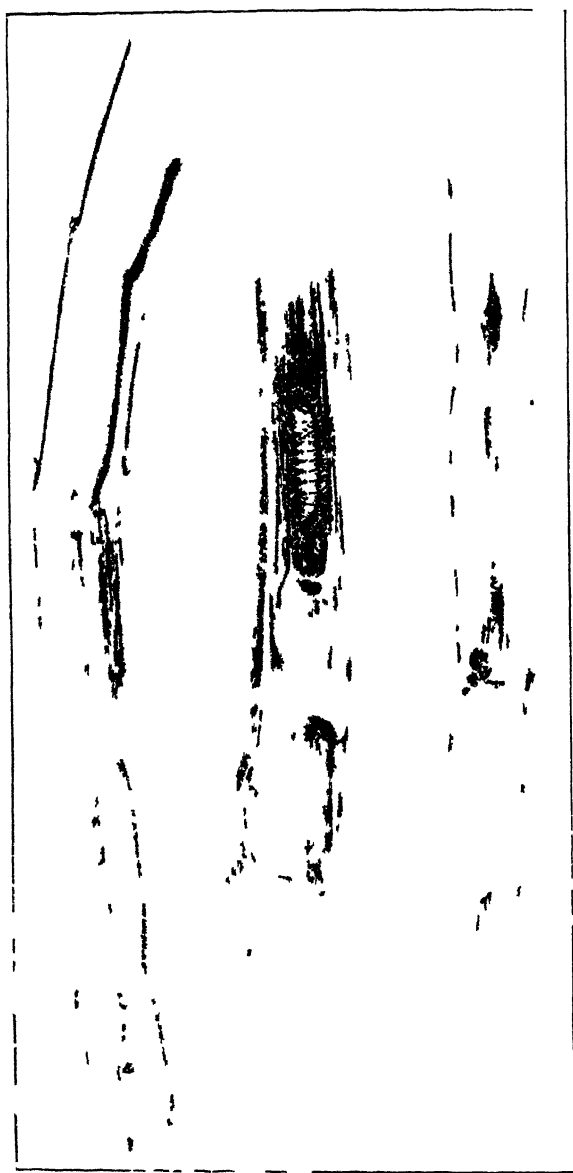


Fig. 17.—Sugar Cane Moth Borer Tunnels—Larvae in Middle Stalk.  
(Holloway.)

1. Plant only cane perfectly free of borers, and at some distance from corn fields if possible, as corn is the favorite food plant of the borer.
2. Destroy all scraps of cane left around the mill after cutting and grinding.
3. In the spring go through the fields and cut out the young plants killed by the borers. Destroy all borers found.
4. Feed or destroy during the winter all standing sorghum, Kafir corn, etc., and plow under the stubble. Destroy large grasses around the infested fields. Cornstalks in badly infested fields should also be destroyed during the winter, as they occasionally contain borers.
5. Be careful not to ship infested seed cane, as this spreads the infestation.

By following these suggestions, it may be possible to almost wipe out this pest in some places.

Every effort is being made to keep the moth borer from spreading. Farmers in all parts of Mississippi should be very careful where they get their seed cane, as there is danger of getting not only the borer, but also the mosaic disease, another serious pest. Cane and corn plants should also be examined frequently for worms boring in the stalks. Specimens should be sent to the State Plant Board at all times.

### The Mediterranean Fruit Fly (*Ceratitis capitata* Wiedemann.)

The Mediterranean fruit fly is generally regarded as the most dangerous insect pest threatening the fruit growers in the warmer regions of the United States. It is found in every tropical and semi-tropical fruit-growing section in the world, except in North America. The nearest known infestations to the United States are in Brazil, Bermuda Islands, and the Hawaiian Islands.

The adult Mediterranean fruit fly resembles the ordinary house fly in size and shape, but is more beautiful, combining



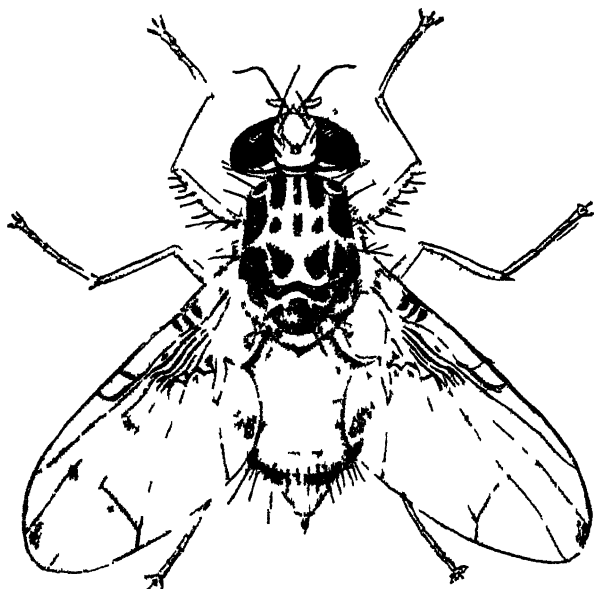


Fig. 18.—Adult male Mediterranean fruit fly. Greatly enlarged. (U.S.D.A.)

black, white, yellow, and brown in its color pattern. The female fly drills holes through the skins of fruits and deposits several eggs in each place. The eggs hatch into white maggots which burrow all through the fruit until they are full grown, at which time they are about one-fourth inch or more in length. The adult fly is not likely to be noticed, but the grown larva may be easily distinguished from other worms occurring in fruits by its habit of curling up and jumping from one to six inches when laid on a smooth surface.



Fig. 19.—Mango fruit showing white maggots of Mediterranean fruit fly and damage caused by them. (U. S. D. A.)

There are several different species of fruit flies in the world, but the Mediterranean fruit fly attacks more different kinds of valuable fruits than any other species. Oranges, lemons, apples, pears, peaches, plums, apricots, grapes, and many other fruits and vegetables are included in the list of



Fig. 20—Bartlett pear, the pulp of which has been entirely eaten out by the maggots of the Mediterranean fruit fly. (U.S.D.A.)

host plants. The greatest damage occurs in tropical countries, hence only the warmer sections of the United States would likely suffer serious loss. No satisfactory control measures are known.

To prevent the introduction of this pest into the United States, the Federal Horticultural Board, assisted by various state agencies, enforces strict quarantines prohibiting to a certain extent the importation of fruits from the infested countries. The State Plant Board is assisting in this work by maintaining inspectors at Gulfport and Pascagoula, who, in addition to the nursery inspection, citrus canker scouting, and their other duties, inspect all ships arriving at these ports.

### The Gipsy Moth (*Liparis dispar* L.)

This serious pest was brought to Massachusetts from France in 1869, but required a good many years to become numerous enough to do much damage. During the past 20 years it has spread rather rapidly and is now found over a large area in the New England States and in New Jersey. It is one of the most serious pests of fruit, shade, and forest trees, destroying large tracts of timber as a result of complete defoliation for several successive years. Some idea of its importance may be gained from the fact that in the State of Massachusetts alone, the State and Federal Governments have spent more than twenty million dollars fighting this pest during the past 20 years.

The gipsy moth caterpillars feed on a great variety of plants. Favorite trees are apple, oak, birch, alder, and willow, though when very numerous the caterpillars feed on any plants, the larger ones even defoliating pine trees. Control measures are rather expensive, including spraying with arsenicals, putting tanglefoot bands around trees, and destroying the egg clusters by painting with creosote.

The female gipsy moth is white with black markings on the wings, and has a wing expanse of about 2 inches, but cannot fly. The male is much smaller, of a dark-brown color, and flies well. The full-grown larva is a dark hairy caterpillar about 2½ inches long, with double rows of red and blue spots down the back. The eggs are laid on tree trunks, under bark, on stones, lumber, or almost any place that affords concealment.



Fig 21.—The Gipsy Moth. Upper left, male moth with wings folded, just below this, female moth with wings spread; just below this, male moth with wings spread; lower left, female moth enlarged, top center, male pupa at left, female pupa at right; center, larva; on branch, at top, newly formed pupa; on branch, just below this, larva ready to pupate; on branch, left side, pupae; on branch, center, egg cluster; on branch, at bottom, female moth depositing egg cluster. All slightly reduced except figure at lower left. (Howard and Fiske.)

Both Federal and State quarantines are enforced to keep this pest from spreading. The State Plant Board maintains a quarantine against all the infested states, prohibiting the shipment of nursery plants, forest trees, lumber, stone, and many other products into Mississippi, except when accompanied by the proper inspection certificate.



Fig 22.—Woodland completely, defoliated by Gipsy Moth Caterpillars.  
(U S. D. A.)

### The Brown-Tail Moth (*Nygmia phaeorrhoea* Don.)

The brown-tail moth was first found in the United States in Massachusetts in 1897, probably having been introduced on nursery stock from Europe a few years before. It was able to spread rapidly and soon covered a large part of the New England States, but on account of the strenuous fight made against it by State and Federal agencies, as well as the activity of parasitic enemies, its numbers have been greatly

reduced and the infested area is now much smaller than it was a few years ago. The brown-tail moth is a serious pest

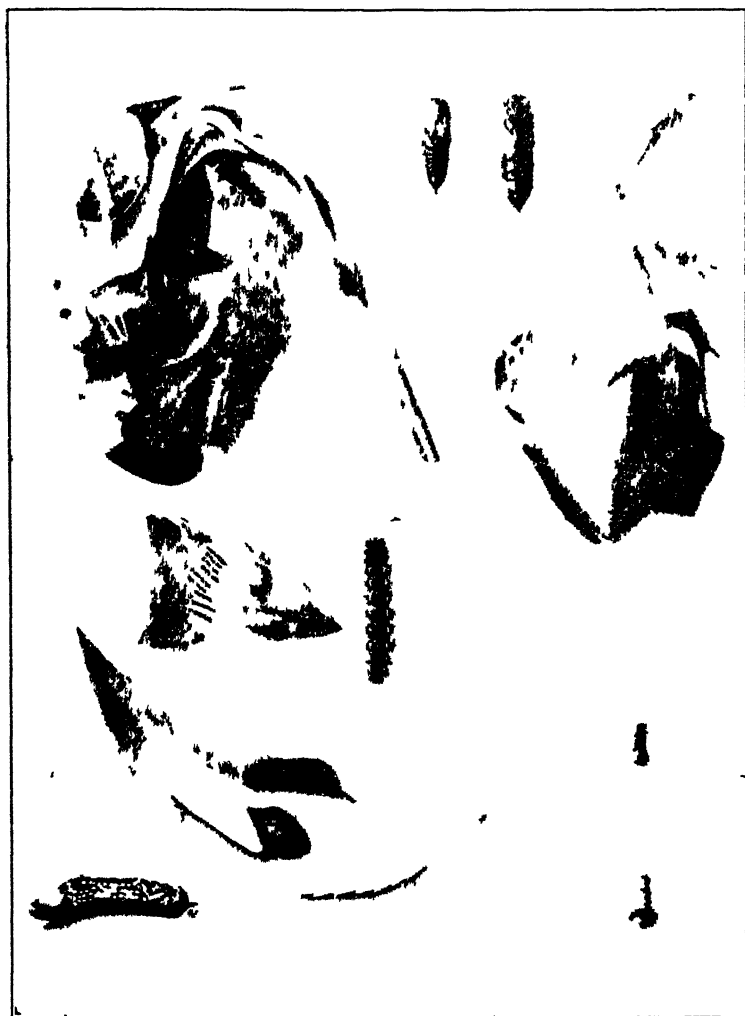


Fig. 23.—The Brown-Tail Moth. Upper left, hibernating web; just below this, small larvae feeding at left, larger larva at right; just below this, female moth depositing eggs at left, egg mass at right; lower left, egg mass with eggs exposed; top center, male pupa at left, female pupa at right; upper right, cocoon incased in leaves; lower right, male moth above, female moth below. All slightly reduced. (Howard and Fiske.)

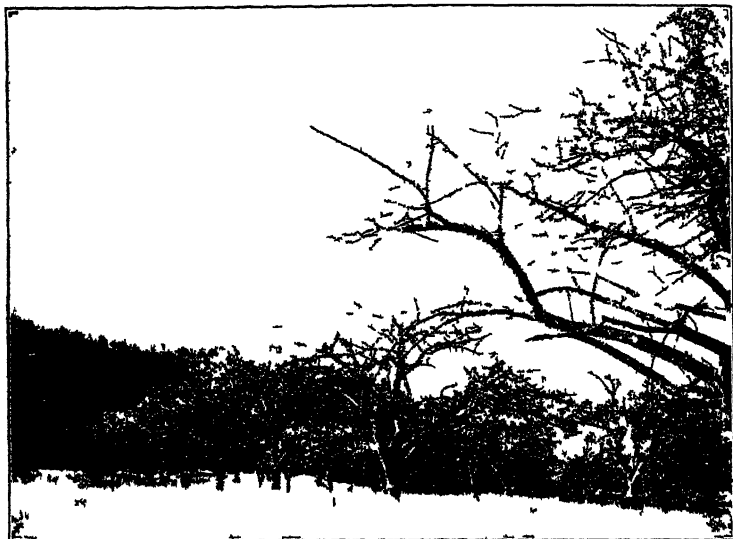


Fig. 24.—Apple orchard completely defoliated by Brown-tail Moth Caterpillars. (U. S. D. A.)

of fruit, shade, and forest trees, but is not quite so injurious as the gipsy moth.

The brown-tail moth caterpillars prefer the foliage of apple, pear, plum, oak, and willow, but also feed on a large number of other trees. However, they do not attack coniferous trees like the pine, as does the gipsy moth. Control measures consist of spraying with arsenicals and destroying the webs in which the caterpillars pass the winter.

The adult brown-tail moths are white, with tufts of brown hairs on the tip of the abdomen. The full-grown larva is a brown caterpillar about  $1\frac{1}{4}$  inches long, with a row of white dashes down each side of its back. These caterpillars are covered with poisonous hairs which are blown about by the wind, often causing serious poisoning when coming in contact with human skin.

Like the gipsy moth, this pest is also quarantined by State and Federal governments, and the necessary restrictions are enforced against shipments from the infested states to prevent its transportation to other parts of the country.

# Control of the Mexican Bean Beetle in the Eastern States

(\*By Neale F. Howard)

The Mexican bean beetle (*Epilachna corrupta* Muls.) is the most serious insect enemy of garden beans in portions of the United States which it inhabits. Long present in the Southwest, it has within the past few years made its appearance in the southeastern States and now covers portions of nine States in the South and North, including Alabama, Georgia, Tennessee, Kentucky, North Carolina, South Carolina, Mississippi, Virginia, and Ohio.

The adult insect or beetle is copper colored, bears eight black spots on each wing cover, and measures about one-fourth of an inch in length. Newly emerged specimens are lemon colored. The female lays orange-yellow eggs in clusters of from 40 to 60 on the lower surface of the leaves, and these hatch in about 6 days during summer into small spiny orange-yellow larvae, which molt three times, gradually becoming larger until they are about one-third of an inch in length. The larva then transforms to the pupa or inactive stage on the under surface of the leaf, or on weeds or objects near by, and emerges as an adult or beetle in about 7 days, making a total from egg to adult of about 33 days during summer in Alabama. A maximum of four generations occurred in 1921 and 1922, two generations with a partial third being the rule.

When the beetles are abundant, the bean plants may be destroyed before a crop is produced. The adults and larvae feed on the under sides of the bean leaves, leaving a characteristic network of tissue which soon dries up. In control practice, therefore, insecticides must be directed to the under surfaces of the leaves. The Mexican bean beetle can be successfully suppressed with the use of the proper insecticide.

\*Entomologist, Truck Crop Insect Investigations, U. S. Bureau of Entomology.



ticide properly applied. Any of the ordinary stomach poisons will poison the larval stages of the bean beetle, and it is in the larval or grub stage that the insect feeds most. But not all stomach poisons may be applied to beans with beneficial results on account of the susceptibility of the bean plant to arsenical injury. Lead arsenate, zinc arsenate, and Paris green are too injurious to beans to be very useful. Good results may be apparent after an application, but yields may be seriously reduced if any of these compounds are applied repeatedly.

Control measures are essential to bean production in sections where the bean beetle thrives.

Magnesium arsenate, of very low water-soluble arsenic content, does not injure common beans, used either as a spray or as a dust. When this material is applied to the under surfaces of the leaves at a pressure of not less than 150 pounds with at least two nozzles to the row, 1 pound to 50 gallons of water, excellent control can be obtained and practically normal yields secured. From one to four applications are necessary for a crop of bush beans, depending on the number of beetles present. Used as a dust, magnesium arsenate may be diluted with hydrated or plasterer's lime from one to five times by weight, depending on the numbers of beetles present.

Calcium arsenate seriously injures beans when used as it comes from the manufacturers. Injury to beans can be eliminated by the use of a large excess of hydrated lime. Excellent results have been obtained with a very high grade of this material used as a spray at the rate of three-quarters of a pound to 50 gallons with a pound and a half or more of hydrated lime. It may also be used as a dust, but **more lime must be used**. No less than five parts of hydrated lime should be used, and even at this dilution, under certain conditions, some plant injury may result. It has been developed by the Alabama Experiment Station that one part of sulphur, when mixed with one part of calcium arsenate and four parts of hydrated lime by weight, has a slight bene-

ficial action in a dust, and this dust can be used under almost all conditions without plant injury.

Where ordinary calcium arsenate, which conforms with requirements of the law, as prepared for use on cotton against the boll weevil, is used, nine parts of hydrated lime will eliminate plant injury. This mixture will give excellent control under most conditions, except where beetles are extremely numerous.

When the beetles are numerous, it is essential to keep a coating of one of the above stomach poisons on the under surfaces of the leaves continually during the growing period. This can be most efficiently and most economically done by the use of a spray where conditions and equipment permit. Where spraying is not practicable, on account of lack of water facilities, type of field, etc., or can not be practiced without unreasonable outlay of equipment, the grower is advised to dust. As in spraying, the dust must be directed to the under surfaces of the leaves.

The type of machine to be used depends upon the size of the field. On fields of usual size in trucking districts from half an acre to 2 acres in area, a wheelbarrow sprayer, capable of maintaining 150 pounds at two nozzles arranged on a "U"-shaped tube so as to direct the spray to the under surfaces of the leaves, will be found fairly satisfactory. This may be mounted on a narrow slide and drawn by a horse. A barrel sprayer may be placed on a wagon and a broom arranged to reach the under surfaces of the leaves. For dusting on this size field, a hand power duster will be found very satisfactory. One of the most important requisites for success is the placing of the dust on the under surface of the leaves. This can be done very well by the use of a knapsack type of hand bellows duster, equipped with a flexible hose and long spout. Other dusters may also prove satisfactory if they are modified so as to direct the dust to the under surfaces of the leaves.

On larger acreages, a traction sprayer or power sprayer, handling from four to eight rows with at least two nozzles

per row, should be used. Where dusting is preferred, a traction duster which is equipped so that the dust can be directed to the under surfaces of the row from both sides will be found the most satisfactory from the standpoint of original outlay and upkeep.

In spraying, about 90 gallons of spray will be required for an acre of bush beans planted in rows 3 feet apart. In dusting, the amount of dust required per acre will depend somewhat on the amount of arsenical in the dust. The amount used should be gauged so that not less than 2 pounds of the arsenical used in the dust is applied to an acre of bush beans planted in rows 3 feet apart. In the calcium arsenate 1, hydrated lime 9, mixture, about 20 pounds are required for an acre. When more concentrated mixtures are used, less dust may be applied.

There is no danger of arsenical poisoning from eating snap beans which have been properly treated with arsenicals, but treated beans should be rinsed twice in clear water before marketing. In accordance with ordinary cleanliness, snap beans should be washed before they are cooked.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....	Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## NEWS NOTES

### NEW BULLETIN ON PECAN SCAB CONTROL

A publication of special interest to every pecan grower in Mississippi has just been issued by the Mississippi Agricultural Experiment Station. This is Circular 53, "Spraying Experiments for Pecan Scab Control in Mississippi in 1923," by D. C. Neal, Plant Pathologist, in collaboration with O. M. Chance, R. P. Barnhart, and E. K. Bynum, Inspectors of the State Plant Board.

During 1923, spraying tests for scab control were conducted at Lucedale, Ocean Springs, and Jackson, using 77 trees of susceptible varieties, varying from 14 to 17 years of age. An excessive amount of rain prevented the application of the spray according to the schedules planned, but even with

this handicap, the sprayed trees produced from 3 to 40 times as many marketable nuts as the unsprayed checks. Various combinations of sprays were tested, but the standard 4-4-50 Bordeaux mixture was apparently the most effective spray used, giving much better control than the summer strength lime-sulphur. Three applications were made during the growing season. Bordeaux mixtures carrying less copper sulphate, such as the 2-6-50 formula, also proved very effective. The addition of oil emulsion or fish oil soap as stickers gave no appreciable increase in control. In groves where no spraying has been done previously, it seems advisable to apply a dormant spray of lime-sulphur—1 to 8 strength—just before growth begins, to destroy the overwintering scab infection on twigs and thus reduce to a minimum the sources of the initial spring infection. Dehydrated lime-sulphur was apparently less effective than the liquid concentrate.

Every pecan grower in Mississippi is strongly urged to get this circular. Requests for it should be addressed to the Director, Agricultural Experiment Station, A. & M. College, Miss.

### FOULBROOD MENACE AVERTED

One of the most desirable counties in Mississippi for beekeeping has just narrowly escaped an infection of American Foulbrood, the worst disease of bees. The whole cause of the trouble was a beekeeper from Iowa who made a journey to Mississippi during the past January, bringing 40 colonies of bees with him on a truck.

The itinerant beekeeper was ignorant of the Mississippi law which prohibits the movement into or within the State of bees, or second-hand beekeeping equipment, except on permits from the State Plant Board, on penalty of not more than \$500 fine or six months in the county jail. Had he tried to ship his bees into Mississippi, the express companies, knowing the law, would have refused to take them, but by bringing them in on his truck he was able to enter unobserved, and had been in the State nearly three months before

news of his presence reached the State Plant Board. An investigation was made at once and his apiary was found infected with American Foulbrood. This disease is widespread in most Northern states and causes enormous losses every year. In Mississippi it occurs only in a few counties in the Delta, where the Plant Board is trying hard to eradicate it.

As soon as the disease was discovered, the beekeeper became anxious to return to Iowa. The Plant Board expedited his movement as much as possible and burned his equipment completely, leaving nothing that might retain the disease and give it to other bees. It is believed that such prompt action was taken that the disease was not communicated to other bees in the vicinity, but since the man was a very careless beekeeper, it is certain that the foulbrood would have spread to other apiaries in a short time.

All beekeepers in Mississippi are urged to assist the Plant board in keeping foulbrood out of the State by reporting promptly when a new keeper moves into a community, or when bees are brought in, especially when moved by truck or wagon from another state.

### **SPLENDID RESULTS WITH ARGENTINE ANT CAMPAIGNS**

From all indications, the Argentine ant control campaigns in which the State Plant Board cooperated last fall were the most successful ever conducted in Mississippi. Investigations have not yet been made in all of the towns, but in every case so far, very satisfactory results were secured and the citizens are hearty in praise of the campaigns.

In Greenville, approximately 95% of the families in the infested area had not seen ants in their houses since the poison was put out. In Itta Bena, only one family out of the 58 interviewed had seen ants in the house, indicating almost perfect control in that town. In Pass Christian, the ants were driven completely out of 82% of the homes where the infestation was very bad last year. In Columbus, 99% control was secured, for of 100 families visited, only one had

seen any ants since the poisoning began. In Fayette, the ants have been practically exterminated, but there will be no cessation of the fight until complete eradication is achieved. While no detailed investigations have yet been conducted in Vicksburg, Meridian, Pascagoula, and a few other places, reports indicate that very successful results have also been obtained in these cities.

Citizens in all the infested towns are urged to lose no time in making arrangements with the Plant Board for control campaigns this fall, for if left alone the ants will increase and spread rapidly, making the cost much greater when a campaign is finally started.

### **NOXUBEE COUNTY ERADICATES FOULBROOD**

In the spring of 1923, American Foulbrood was found in Noxubee County in 6 apiaries, one of them containing approximately 700 colonies. Owners of the infected apiaries immediately gave the Plant Board the fullest cooperation, and at the last inspections in the fall no disease was found. However, it was feared that the foulbrood would again be in evidence this spring, but inspections of every brood frame in every hive of all the infected apiaries were completed during May without finding anything suspicious. As an extra safeguard, another inspection will be made in the summer, but it is believed that the disease has been already eradicated.

### **MEXICAN BEAN BEETLE IN ALCORN AND PRENTISS**

In addition to several new infestations in Itawamba and Tishomingo Counties, Inspector R. B. Deen has found the Mexican Bean Beetle during the past month at Corinth and Kossuth in Alcorn County, and at Booneville, in Prentiss County. This is a spread of several miles farther west than the beetles were found last year, and as other activities have prevented much scouting this spring, it is probable that other infestations may be found still farther west.

To date, the Mexican bean beetle has been found on approximately 50 farms in the State, but there is no doubt that

it occurs on a great many more. The State Plant Board is endeavoring to keep in touch with the owners of all the infested farms, giving them the benefit of the latest control measures advised by the Bureau of Entomology, as embodied in the article by Mr. N. F. Howard, which appears elsewhere in this issue. Especially in the eastern part of the State, farmers should examine their garden beans for this pest, and send any suspicious specimens to the Plant Board for determination.

### PHOTOS REQUIRED OF NURSERY AGENTS

"Let me see your photographic certificate" is the proper question to ask every fruit tree agent in Mississippi. Reports have recently reached the office of the Plant Board that a fake fruit tree agent during the past few months has defrauded a number of people at McComb, Centerville, Canton, Durant and other places, out of sums of money paid for fruit trees which were never delivered. The swindler was taking orders for a reliable nursery and collecting part of each order in advance. The nursery had never heard of him until buyers began complaining about not receiving their orders. The Plant Board was notified immediately, but the agent had apparently left the state.

To guard against such swindlers, the Plant Board urges every buyer of fruit trees to ask each agent for his certificate signed by the State Nursery Inspector. For further protection, each certificate has on it the photograph of the agent holding it, and duplicate certificates and photographs are on file in the office of the Nursery Inspector. Buyers of trees are advised that this is the only way they can be certain that they are dealing with reliable, registered agents.

The registered nursery agents in Mississippi are anxious to assist the Plant Board in keeping swindlers out of the State, and in fairness to them, buyers should request every agent to show his certificate. It is interesting to note that this is the first case of fraudulent dealing in fruit trees that has been reported in Mississippi for more than three years. Several years ago a number of fake agents were working in



this state, but some were arrested by the Plant Board and the rest got out of the State as quickly as possible. This is the first case that has been reported since the Board put the others to flight.

### POTATO PLANT SHORTAGE

Reports received by the State Plant Board from all parts of Mississippi, as well as from other Southern states, indicated that there was a very serious shortage of certified sweet potato plants in the South this spring. While there are about 150 certified sweet potato plant growers in Mississippi this year, many of them had orders booked for their entire output for several weeks ahead. The same condition was true among the certified growers in Tennessee, Arkansas and Georgia, as many orders from Mississippi were refused by firms in those states. The shortage was caused by losses of seed potatoes from the extreme cold during the winter, and also by the unfavorable growing season this spring.

On account of the shortage, the Plant Board suggested that buyers would be more likely to secure plants by ordering small amounts from each of several growers instead of placing one large order with a single grower, and that these plants could be supplemented by vine cuttings later in the season. With a view to getting vine cuttings as quickly as possible it was urged that the plants should be given the best of care and cultivation and fertilized liberally with nitrate of soda to stimulate growth. With a normal amount of rainfall, a good crop of potatoes may be expected from vine cuttings put out as late as July 15, and even later in some cases. Many people prefer potatoes from vine cuttings, and one great advantage of using them is that all growers will have splendid seed potatoes for next year's crop, especially if they have been planted on new land or in fields free from potato diseases. Under no condition should anyone buy uncertified plants, as they are likely to have black rot and other diseases and make less of a crop than will be secured from vine cuttings, besides infecting the soil with the disease which will remain for several years, even if potatoes are not grown on the land again.

## WORMS ATTACK BEANS

County Agent J. H. Price and Inspector R. P. Colmer reported to the State Plant Board a very unusual occurrence in the trucking sections of Jackson County about the last of May. According to the report, entire fields of beans were threatened with destruction by the corn earworm or cotton bollworm. The worms were tunneling through the bean pods, making them worthless for market purposes. This insect often does serious damage to corn, cotton, tomatoes, tobacco, and other crops. but has seldom caused very serious injury to beans.

Prompt action in spraying the fields with an arsenical poison prevented any very great loss. On account of the very tender foliage of beans, great care had to be used in selecting an effective poison that could safely be used. A spray of 1 pound of calcium arsenate in 50 gallons of water, plus 5 pounds slaked lime, gave splendid control without any burning of the foliage. This strength spray is advised by the State Plant Board for all chewing insects attacking beans, including worms, cucumber beetles, bean leaf beetles, the Mexican bean beetle, and other pests. The calcium arsenate may be easily secured almost anywhere in the State on account of its wide use in poisoning the boll weevil.

If a sprayer is not available, beans may be dusted with a mixture of 1 part calcium arsenate and 9 parts slaked lime.

## TOMATO GROWERS SUFFER

Complaints from the trucking sections of Hinds and Copiah Counties, and other sections of the State, indicate that the tomato fruit worm caused the growers rather serious loss early in June. In fact, one report stated that several thousand dollars loss was caused in one locality.

Tomatoes that were dusted or sprayed regularly with arsenical poisons were not attacked to any extent. In a test at the Poplarville Branch Experiment Station last year, an unsprayed plat of tomatoes had 11½% of wormy fruits, compared with only 1½% loss on a plat sprayed 3 times with

lead arsenate. While much better results are obtained by starting early, growers were advised that even late dusting or spraying would be profitable except where shipping was to begin in a few days. The applications advised were: dusting with either lead arsenate or calcium arsenate, or spraying with one pound powdered lead arsenate in 50 gallons water, plus 5 pounds slaked lime to prevent burning. Where such poisons are applied not less than 10 days before harvesting begins, the possibility of poisoning the consumer is very slight.

In addition to spraying or dusting, it was recommended that all wormy fruits should be picked and destroyed. This is especially important where the fruits are too mature to allow poisoning, for if wormy fruits are left in the field, the moths that develop from these worms will deposit eggs on younger plants and seriously injure the later crop.

### PLANT SMUGGLERS ACTIVE

In May, Mr. T. F. McGehee, Assistant Entomologist of the Plant Board, stationed at Holly Springs, intercepted an express shipment of uncertified and uninspected sweet potato plants entering Mississippi under the false label of "Seeds." The shipment was made by a Memphis dealer who has failed for three years to meet the Plant Board requirements for shipping plants into Mississippi. Such illegal shipments are promptly destroyed. This underhand method of shipping diseased or uncertified plants into the State was employed last year by another Memphis firm in sending sweet potato plants by parcel post as "Shoes." However, this violation of the Federal Postal Laws carries a severe penalty, and a similar case has not been discovered this season.

### CAMPAIGN AGAINST SUGAR CANE MOTH BORER

During the first week in June efforts were made by the Plant Board to stimulate as much interest as possible in controlling the sugar cane moth borer in the seven infested counties in Mississippi. Special emphasis was placed on

the importance of going through the fields at that time, cutting out all dead plants, and destroying the borers in them. Articles were sent to all newspapers in the infested counties of Jackson, Harrison, Hancock, Pearl River, Amite, Adams, and Wilkinson, and all counties adjoining them, urging farmers to use the control measure suggested. County agents and Plant Board inspectors in the infested areas joined in getting the owners of infested farms interested in controlling the pest.

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## Paradichlorobenzene

Every farmer in Mississippi with a peach orchard should begin making preparations to use this chemical this fall to destroy the peach borer. Almost perfect control is secured with very little expense. In North Mississippi, applications should be made from October 5 to 10; in Central Mississippi, from October 10 to 15; and in South Mississippi, from October 15 to 20. The treatment should not be applied to trees under 4 years of age. On trees 4 and 5 years old, three-fourths ounce per tree should be used. On trees 6 years of age and older, the full ounce dose is advised. On old trees with very large trunks,  $1\frac{1}{4}$  ounces may be used. The crystals should be placed in an even ring around the tree, about  $1\frac{1}{2}$  inches from the tree and about  $1\frac{1}{2}$  inches wide, and covered well with several shovelfuls of soil. Four weeks after making the application, the mounds around the 4 and 5-year old trees should be removed, with any remaining crystals of the paradichlorobenzene. With 6-year old trees and older, the mounds should be removed at the end of six weeks.

An illustrated description of this method of killing the peach borer by Mr. O. I. Snapp, in charge of the Peach Pest Laboratory, at Fort Valley, Georgia, was published in the July, 1923, issue of this Bulletin. Those who have a copy of this issue should refer to it before applying the treatment this fall, and also note the changes in recommendations

since last year. At that time no injury had been recorded on 3-year old trees, but more recent experiments by Mr. Snapp show that there is considerable danger in using this treatment on trees of that age, hence it is now advised only for trees 4 years of age and older.

Anyone desiring more detailed information about using paradichlorobenzene for the peach borer, and also a list of Mississippi insecticide dealers selling this chemical, should write the State Plant Board. Paradichlorobenzene is also sold by a number of drug stores in Mississippi.

## APIARY INSPECTION REPORT

For Period April 1—June 30.

County	Frame Hives	Box Hives	European Foulbrood	American Foulbrood
Alcorn-----	118	----	----	----
Bolivar-----	123	20	----	----
Clay-----	105	----	----	----
Humphreys-----		2	----	----
Lowndes-----	1290	----	----	----
Monroe-----	117	93	----	----
Noxubee-----	696	2	----	----
Oktibbeha-----	56	----	----	----
Sunflower-----	185	83	3	1
Tallahatchie-----	55	5	1	----
Tishomingo-----	24	----	----	----
Washington-----	857	7	36	138
TOTAL-----	3626	212	40	139

Foulbrood eradication will be pushed as much as possible during the next quarter and it is hoped that a great decrease will be shown in the number of infected colonies.

**REPORT OF THE NURSERY INSPECTOR****For the Quarter Ending June 30, 1924**

Number of Nurseries Inspected During Quarter---- 74

Acreage in Nurseries Inspected During Quarter----596.47

Amount of Nursery Stock Inspected:

Grafted and budded pecans----- 312,356

Seedling pecans -----4,521,180

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 Total pecans----- 4,833,536

Citrus trifoliata -----1,215,950

Orange ----- 135,010

Kumquat ----- 712

Grapefruit ----- 1,202

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 Total citrus----- 1,352,874

Apple ----- 4,090

Pear ----- 62,050

Peach ----- 6,040

Fig ----- 3,275

Japanese persimmon ----- 1,302

Grape ----- 14,550

Strawberry ----- 4,500

Blackberry ----- 200

Blueberry ----- 6,000

Miscellaneous fruit ----- 12

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 Total fruit (Citrus Excluded) -- 102,019

Rose ----- 5,785

Other ornamentals ----- 150,712

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 Total ornamentals ----- 156,497

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 Grand total of plants inspected during quarter 6,444,926

**QUARANTINE INSPECTION REPORT****For Period from April 1 to June 30, 1924.****(Geo. F. Arnold, Quarantine Inspector)****Ships and vessels inspected:**

From foreign ports .....	5
From U. S. Ports .....	0
Total .....	5

**Parcels inspected:****Arriving by water:**

Passed .....	0
Treated and passed .....	0
Returned to shipper .....	0
Contraband destroyed .....	0
Total .....	0

**Arriving by land, express, freight, wagon, etc:**

Passed .....	586
Treated and passed .....	0
Returned to shipper .....	4
Contraband destroyed .....	5
Total .....	595

**Arriving by mail:**

Passed .....	991½
Treated and passed .....	21
Returned to shipper .....	1
Contraband destroyed .....	48½
Total .....	1062

**Grand total of parcels inspected.....1657****Number of parcels on hand June 30, 1924 pending de-termination as to final disposition.....**

Total parcels passed .....	4
Total parcels treated and passed .....	1577½
Total parcels returned to shipper .....	21
Contraband destroyed .....	5
Total .....	53½

**Grand Total .....**1657

**CITRUS CANCKER SCOUTING REPORT****For Period January 1, 1924—June 30, 1924.**

Number of counties in the state which have at one time or another since 1916 shown canker-----	4
Number of counties showing canker January 1, 1924—June 30, 1924 -----	0
Number of grove trees inspected January 1, 1924—June 30, 1924 -----	54,481
Number of nursery trees inspected January 1, 1924—June 30, 1924 -----	286,320
Number of <i>C. trifoliata</i> inspected January 1, 1924 June 30, 1924 -----	252,902
Total number of grove trees found infected June 1, 1916—June 30, 1924 -----	3,117
Total number of nursery trees found infected June 1, 1916—June 30, 1924 -----	51,167
Number of properties infected during 1917-----	47
Number of properties infected during 1918-----	14
Number of properties infected during 1919-----	4
Number of properties infected during 1920-----	0
Number of properties infected during 1921-----	1
Number of properties infected during 1922-----	8
Number of properties infected during 1923 and 1924----	0
Number of new properties infected during 1917-----	12
Number of new properties infected during 1918-----	1
Number of new properties infected during 1919 and 1920	0
Number of new properties infected during 1921-----	1
Number of new properties infected during 1922-----	8
Number of new properties infected during 1923 and 1924	0
Total number of properties infected June 1, 1916—June 30, 1924 -----	130
Total number of properties declared no longer danger centers -----	130





THE QUARTERLY BULLETIN  
— OF THE —  
STATE PLANT BOARD  
OF MISSISSIPPI

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VOL. 4

OCTOBER, 1924

No. 3

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

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# Cotton Wilt and How to Control It

*By J. F. O'Kelly, Plant Breeder, and D. C. Neal, Plant Pathologist, Mississippi Experiment Station*

A disease which usually causes the greatest damage to cotton growers in many counties of Mississippi is one commonly known as wilt, or black root. The most noticeable symptoms of this disease is the wilting and death of infected plants. This disease is widely distributed throughout the State and has during the past two or three years been reported from practically every county in the State. It is present in varying amounts from year to year, but this season the damage has been unusually high, due no doubt to the high temperature and dry weather which has prevailed over the State the greater part of the summer.

## How to Recognize Wilt

Cotton wilt may be suspected when plants wilt and die without any apparent cause. If the stem of a freshly wilted plant is cut across near the ground and found to be black or brown inside, there is strong evidence of the disease. (Fig. 1.) Plants attacked by wilt early in the season are considerably stunted and yellow as compared with healthy plants. Frequently the main stem of such a plant remains short, while some of the lower branches grow normally. The disease usually occurs first in irregular spots in the field, which may increase in size from year to year. Sometimes plants are attacked early in the season and all through the season the affected stalks die.

## The Cause of Wilt

Cotton wilt is caused by a fungus technically known as *Fusarium vasinfectum*, which enters the roots of the plants through the soil. It grows into the water-conducting vessels of the plants, plugging them and shutting off the water supply and causing the plant to wilt and finally die. It

occurs most generally and probably most severely on the light, sandy soils of the State; however, the disease has frequently been encountered and reported from the Delta, or alluvial soils of the State. The fungus is able to exist in the soil for long periods of time, in fact, for several years. It is spread from field to field by animals, men, tools, wind, drainage water, and perhaps other agencies. It is generally believed that the fungus is not seed borne but there is some recent, altho not definitely conclusive, evidence to the contrary.

### **How to Control Wilt**

Planting of wilt-resisting varieties of cotton combined with the use of proper crop rotation is the only effective method known for controlling wilt. The use of wilt-resistant varieties cannot be emphasized too strongly, since the cotton wilt fungus is able to remain viable in the soil for long periods of time, and even a three or four year rotation period cannot be solely relied upon as a control measure.

### **Wilt Resistant Varieties**

The Mississippi Experiment Station has conducted a considerable number of variety tests to compare the relative resistance or tolerance of different cotton varieties to the wilt disease. These tests were planted on wilt infected soil which had also been inoculated to insure more complete exposure of the plant roots to the fungus. A list of those varieties which have been found to possess resistance will be found below. The sources from which the seed were obtained are also given.

The fact that a variety is very resistant to wilt is no indication that it will always produce high yields. In fact, the Station has experienced considerable difficulty in finding resistant varieties which also yield well. Under moderate wilt infection and favorable weather conditions, susceptible varieties have occasionally produced more before being checked by the disease than resistant varieties. Varieties possessing resistance are being improved in this respect, however, and the list given contains several varieties which should give very satisfactory results.

Several of the varieties named have been tested at the different branch stations on soils not infected with wilt and the results have been published in bulletins and circulars already issued by the Experiment Station. The other varieties have been tried only at the Central Station, A. & M. College, but they are, as a rule, adapted to conditions suitable for other big boll short staple varieties.

This Station has no fertilizer results which indicate conclusively that the application of any particular fertilizer will prevent wilt injury. It is believed, however, that if the soil is deficient in any particular plant food, whether it be phosphorous, nitrogen, or potash, supplying the deficient element should aid the plant in resisting disease.

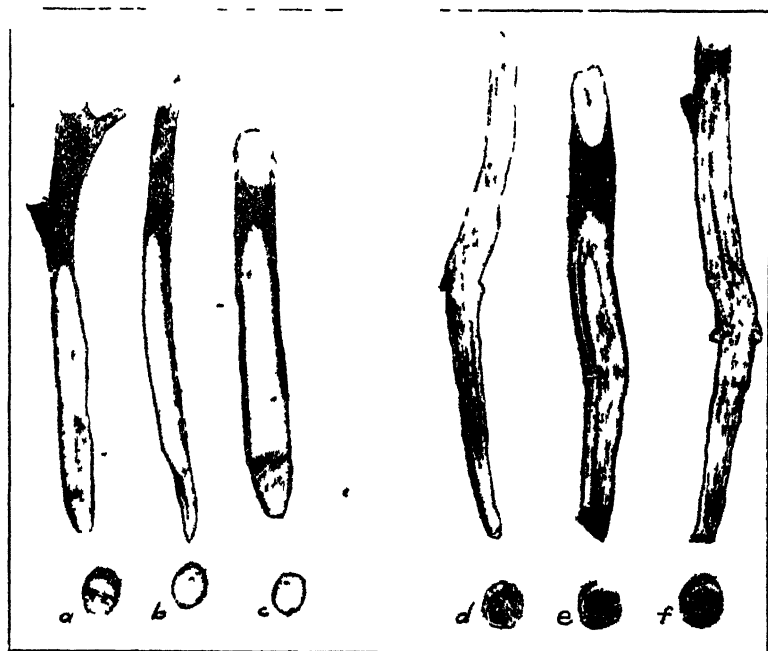


Fig. 1.—Longitudinal sections of cotton stems showing wilt infection. Healthy stems at left a, b, and c. Wilt infected stems at right d, e, and f. Note the brownish black discoloration in the infected stems.

**WILT RESISTANT COTTON VARIETIES****Most Resistant**

Cook, Rhyne ----- Rhyne Bros., Benton, Alabama  
 Cook, 307-6 -- Alabama Experiment Station, Auburn, Ala.  
 Covington-Toole -- W. F. Covington, Montgomery Alabama

**Considerably Resistant**

Dixie-Triumph -----L. O. Watson, Florence, S.C.  
 Miller--Miss. Experiment Station, A. & M. College, Miss.  
 Solomon & Oates Big Boll--Solomon & Oates, Headland, Ala.  
 Toole, Wilkinson----- C. F. Wilkinson, Headland, Ala.  
 Watson's Long Staple -----L. O. Watson, Florence, S. C.

**Semi-Resistant**

Cleveland 54 --Miss. Experiment Sta., A. & M. College, Miss.  
 Salsbury -----Delta and Pine Land Co., Scott, Miss.  
 Triumph, Willis--Hinds County Farm Bureau, Jackson, Miss.

**SPRAY FOR SAN JOSE SCALE THIS WINTER**

San Jose scale is the worst orchard pest in Mississippi, and there is hardly an orchard in the State which will not need spraying this winter. The following recommendations are made as brief and simple as possible to encourage more people to use some effective spray this winter. San Jose scale is usually controlled by one thorough spraying each year, which should be applied during December, January, or February, while the trees are dormant. Good results should be obtained with any one of the following sprays if the entire surface of the trees is covered.

**Lubricating Oil Emulsion**

Lubricating oil emulsion is probably the cheapest and most effective spray for San Jose scale. It is also the easiest to apply. When made according to the Government formula, 3 gallons of the emulsion will make 100 gallons of 2% spray, which is the proper strength for apples, pears,

peaches and plums. This emulsion can be made at home, but in most cases it will doubtless be cheaper and better to buy it ready prepared. If made at home, the cold-pumped formula below, which requires no heating, will be found most satisfactory:

Red Engine Oil or oil of similar grade-----	2 gallons
Water -----	1 gallon
Calcium caseinate -----	4 ounces

The calcium caseinate and water are first mixed thoroughly, and then stirred rapidly while the oil is added slowly. The emulsion should then be pumped three times under pressure from one container to another. A good barrel pump is needed, but for making small quantities a bucket pump or compressed air pump will be satisfactory. The emulsion made from this formula will not hold up long and should be made each day as needed. The amounts used in the above formula will make 100 gallons of 2% spray. The Plant Board will be glad to furnish addresses of dealers who sell the ready prepared oil emulsion, or the calcium caseinate for those who desire to make the emulsion at home.

### Miscible Oil Sprays

There are several miscible oil sprays which give good results in controlling San Jose scale, but they are usually more expensive than the lubricating oil emulsions. They are sold under a number of trade names ("Scalecide," etc.) by several dealers in Mississippi and surrounding states.

### Lime-Sulphur Concentrate

This is also a very effective spray for San Jose scale. It may be bought already prepared from a number of dealers in Mississippi, or may be made at home. Different brands of the prepared concentrate vary in strength, so the directions on the containers should be carefully followed in diluting the concentrate with water before spraying. Usually 1 part of the concentrate is added to 7 or 8 parts of water for the dormant spray. Directions for making the concentrate at home in large quantities may be secured from the Plant Board.



### Homemade Lime-Sulphur Wash

Where the spray materials mentioned above are not easily obtained a homemade lime-sulphur wash is recommended and has given splendid results. The formula and method of making are as follows:

Stone lime .....	20 pounds
Sulphur (commercial) .....	15 pounds
Water .....	50 gallons

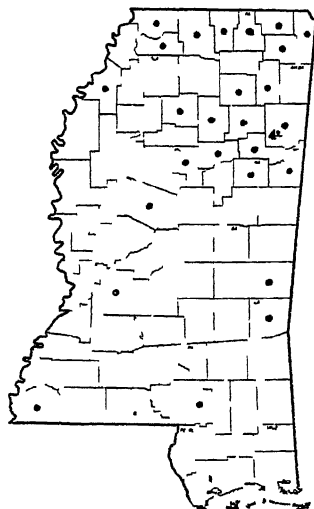
Heat about one-third of the total quantity of water in a cooking barrel or vessel. When the water is hot, add all the lime and at once add all the sulphur, which previously should have been made into a thick paste with water. After the lime has slaked, about another third of the water, preferably hot, should be added, and the cooking continued for one hour, after which the rest of the water is added, either hot or cold. Frequent stirring is necessary if this wash is cooked by direct heat in kettles. If cooked by steam, no stirring will be necessary. It may be cooked in large kettles, or preferably by steam in large tanks or barrels. After the wash has been prepared, it must be well strained as it is being run into the spray tank. It should be applied promptly after preparation, since, as made by this formula, there is crystallization of the sulphur compounds and hardening of the sediment upon cooling. This wash is more expensive than any of the sprays mentioned above.

## SWEET POTATO MOSAIC

*By D. C. Neal and J. M. Wallace*

Sweet potato mosaic has been reported from many sections of the State during the present season. In 1923 this disease was reported only from Marshall County, whereas this year plants affected with it have been received from the twenty-eight counties shown in Fig. 2. This apparently rapid increase is probably due to the fact that this disease

was not considered as very serious until last year, and as Plant Board inspectors were concentrating all their energies on controlling black rot and stem rot, no efforts had been



**Fig. 2.—Mississippi Counties reporting mosaic disease of sweet potatoes during 1924.**

made to discover the distribution of mosaic in Mississippi. Several inspectors had doubtless observed mosaic plants from time to time but had attributed the appearance to injury from natural causes. The infections reported in the individual counties ranged from a trace to a maximum of less than .5 of 1 per cent.

#### **Symptoms of the Disease.**

The appearance of mosaic infected plants in a field is very striking—individual leaves of the plants have numerous fine whitish or chlorotic areas appearing as short or long, delicately penciled lines. (Fig 3.) These lines are very irregular, frequently joining each other at close intervals and enclosing small healthy looking greenish areas, the whole producing a mottling or mosaic effect. Leaves with these mottled or puckered symptoms have as a rule, deeply lobed or uneven margins as compared with healthy leaves. Figures 3, 4, and 5 illustrate these differences.

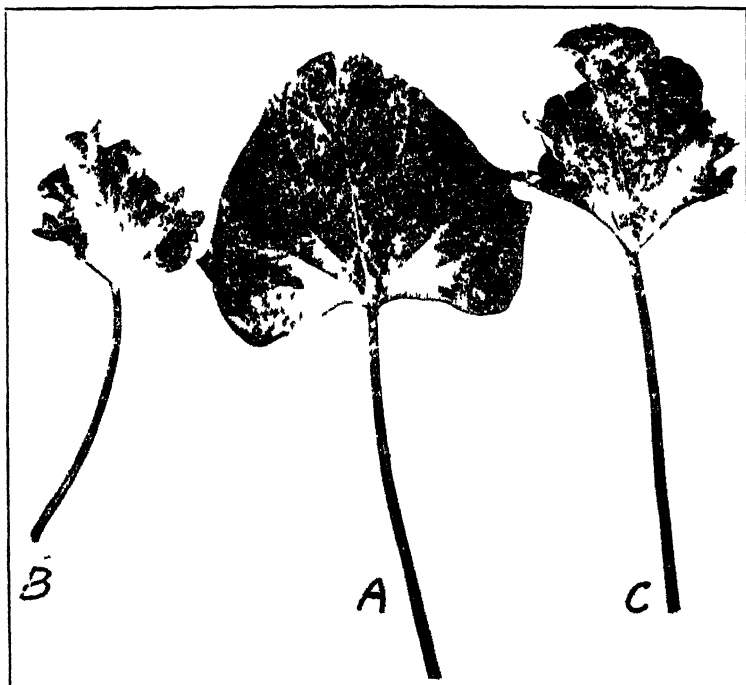


Fig. 3.—Sweet potato leaves showing mosaic disease. Healthy leaf at A. Leaves infected with mosaic at B and C.

#### Transmission of Mosaic

Observations thus far made in this and other states indicate that sweet potato mosaic is not readily communicable from diseased to healthy plants. It has not been established whether secondary infection is possible, or what insects, if any, are instrumental in acting as carriers of the mosaic. There is no evidence to show that the disease is transmissible by means of infected soil. It is perpetuated by using seed potatoes from affected plants, and the reduction in yields from planting such stock is rapidly cumulative. Although sweet potato yields have not been reduced to any great extent as yet in Mississippi as a result of mosaic, some growers in Tennessee and Arkansas have reported a reduction in yield of 50 to 60 per cent because of the disease.



**Fig. 4.**—A portion of sweet potato vine with all the leaves showing mosaic symptoms. Note the rolled margins and chlorotic areas of the leaves.

#### **Varieties of Sweet Potato Affected by Mosaic**

In all the inspections made the past summer in Mississippi for evidence of mosaic disease of sweet potatoes, the greater part of the infections observed were on the Nancy Hall variety. However, positive evidence of the disease has been obtained on Triumph, Porto Rica, Florida Yam, and California Yam. It is very probable that the disease will be found on other varieties in the future.

#### **Control**

In combatting the mosaic disease of sweet potatoes, it has been found by pathologists and horticulturists that any

method of getting rid of the diseased plants will effectively control and perhaps entirely eradicate the disease. The following practice is recommended: Destroy all diseased plants, including the roots, as soon as they are discovered in the field. Burn all diseased or rogued plants. Two successive



Fig. 5—A portion of a healthy sweet potato vine with normal leaves. Contrast with Figure 4.

seasons of careful field observations and roguing diseased plants will probably eliminate this disease from any one lot of sweet potatoes. It is to be hoped that this brief description of this new sweet potato disease will assist the grower in recognizing this trouble, in order that he may assist the Plant Board in eradicating it in Mississippi. Any suspicious plants or those suspected of having mosaic, should be forwarded to this laboratory, not only for examination but to assist us in keeping data on its spread and development in the State.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

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Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

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Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

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R. W. HARNED, Entomologist.....Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

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## AMERICAN FOULBROOD ERADICATED

American Foulbrood has been apparently eradicated from Mississippi during the past three months. Starting with several hundred diseased colonies in the spring, Plant Board inspectors and beekeepers have co-operated in fighting this disease until not a single infected colony is known in the State at this time. In large apiaries that were badly diseased, the shaking treatment was generally employed, and with such precautions that only in rare instances did the infection persist in the apiary. In small apiaries, or where only a few colonies were infected, the diseased colonies were usually destroyed by burning.

Beekeepers of Mississippi should congratulate themselves on being free from this menace, the dreaded scourge of the apiarist in nearly every northern and western state. However, if American Foulbrood is to be kept out of Missis-

Mississippi permanently, the co-operation of every beekeeper must be extended to the Plant Board. And in no way is this co-operation better shown than in reporting or sending information to the Plant Board about new beekeepers entering Mississippi from other states. An infection of American Foulbrood was thus prevented in the eastern part of the State this year. The Plant Board has a record of all bees entering Mississippi by freight or express, and can inspect them immediately after they reach the State, but where bees are brought in by wagon or truck they may remain for a long time unknown to the Board, and have ample opportunity to spread disease. Hence, all beekeepers should promptly notify the Plant Board when new bees are brought into a community, in order that quick action may be taken if they are diseased.

### APIARY INSPECTION REPORT

For Period July 1-Sept. 30.

County	Frame Hives	Box Hives	European Foulbrood	American Foulbrood
Adams -----	112	----	----	----
Attala -----	2	40	----	----
Bolivar -----	179	98	3	----
Coahoma -----	227	93	10	----
Humphreys -----	20	----	----	----
Jefferson -----	24	22	----	----
Leflore -----	163	52	8	----
Madison -----	50	----	----	----
Panola -----	242	179	12	----
Quitman -----	395	43	3	(14)
Sharkey -----	153	40	2	----
Sunflower -----	----	26	----	----
Tallahatchie -----	169	131	----	----
Tunica -----	63	10	----	----
Washington -----	1283	----	19	(97)
Yazoo -----	120	40	----	----
<b>TOTAL -----</b>	<b>3202</b>	<b>774</b>	<b>57</b>	<b>*(111)</b>

\*American Foulbrood colonies burned or treated.

The above report does not show the total number of colonies of bees in the counties mentioned, as in some cases the inspections were made just as the opportunity occurred by inspectors who happened to be in those counties on other business. In several instances also, apiaries that were free of disease at the inspections made during the preceding quarter were not inspected again, as special attention was given to infected apiaries. Numbers in parenthesis indicate the amount of American Foulbrood present at the first inspection during this quarter, but these colonies have been burned or treated, and not a single known infection of American Foulbrood is left in the State.

European Foulbrood has been greatly reduced also, due in part to the efforts of the Plant Board inspectors and beekeepers, and in part to the heavy honey flow that occurred in most sections of the State this year. At the last inspection of the present quarter, only 57 colonies were known to be infected with European Foulbrood.

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### SPRAY DEALERS LISTED.

To assist fruit growers, gardeners, and farmers in securing spraying supplies promptly, the Plant Board has just prepared a list of dealers in spray pumps, insecticides, and other spray materials in Mississippi and surrounding states. Efforts have been made to include every Mississippi dealer in this list, and any who have not already notified the Plant Board should write at once and have their names added. Besides exclusive dealers in spray materials, the list includes a large number of drug stores, hardware stores, and seed houses that carry spraying supplies in stock. Anyone desiring a copy of this list should write the State Plant Board, A. & M. College, Miss.



## NURSERY INSPECTION REPORT

For the Quarter ending September 30, 1924.

Number of Nurseries Inspected During Quarter -- 165

Acreage in Nurseries Inspected During Quarter-- 568.94

Amount of Nursery Stock Inspected:

Grafted and budded pecans-----114,001

Seedling pecans -----608,325

Total pecans ----- 722,326

Citrus trifoliata ----- 1,333,200

Orange ----- 149,340

Kumquat ----- 1,542

Lemon ----- 400

Grapefruit ----- 2,724

Total citrus ----- 1,487,206

Apple ----- 18,350

Pear ----- 71,345

Peach ----- 49,566

Plum ----- 3,537

Quince ----- 500

Fig ----- 6,075

Grape ----- 13,206

Strawberry ----- 1,743,000

Blueberry ----- 7,015

Total fruit (citrus excluded) 1,916,819

Rose ----- 79,782

Other Ornamentals ----- 1,168,167

Total Ornamentals ----- 1,247,949

Grand Total of plants inspected during quarter ----- 5,574,300

## QUARANTINE INSPECTION REPORT

For period from July 1 to September 30, 1921

By Geo. F. Arnold, Quarantine Inspector.

## Ships and vessels inspected:

From foreign ports -----	1
From U. S. Ports -----	0
Total -----	1

## Parcels inspected:

Arriving by water—	
Passed -----	0
Treated and passed -----	0
Returned to shipper -----	0
Destroyed -----	0
Total -----	0

Arriving by land; express, freight, wagon, etc.	
Passed -----	12
Treated and passed -----	0
Returned to shipper -----	0
Destroyed -----	1
Total -----	13

Arriving by mail—	
Passed -----	52
Treated and passed -----	0
Returned to shipper -----	0
Destroyed -----	1
Total -----	53

Total -----	53
Grand total of parcels inspected -	96

Number of parcels on hand September 30, 1921,  
pending determination as to final disposition

Total parcels passed -----	91
Total parcels treated and passed -----	0
Total parcels returned to shipper -----	0
Contraband destroyed -----	2
Total -----	-

Grand total -----	96
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**CITRUS CANCKER SCOUTING REPORT****July 1-September 30, 1924.**

Number of counties in the State which have at one time or another since 1916 shown canker----	4
Number of counties showing canker July 1, 1924, to September 30, 1924 -----	0
Number of grove trees inspected July 1, 1924, to September 30, 1924-----	44,584
Number of nursery trees inspected July 1, 1924, to September 30, 1924 -----	156,151
Number of <i>C. trifoliata</i> inspected July 1, 1924, to September 30, 1924 -----	226,107
Total number of grove trees found infected June 1, 1916, to September 30, 1924 -----	3,117
Total number of nursery trees found infected June 1, 1916 to September 30, 1924 -----	51,167
Number of properties infected during 1916 -----	108
Number of properties infected during 1917 -----	47
Number of properties infected during 1918 -----	14
Number of properties infected during 1919 -----	4
Number of properties infected during 1920 -----	0
Number of properties infected during 1921-----	1
Number of properties infected during 1922 -----	8
Number of properties infected during 1923 and 1924--	0
Number of new properties infected during 1917 -----	12
Number of new properties infected during 1918 -----	1
Number of new properties infected during 1919-1920 --	0
Number of new properties infected during 1921 -----	1
Number of new properties infected during 1922 ----	8
Number of new properties infected during 1923-1924--	0
Total number of properties infected June 1, 1916 to September 30, 1924 -----	130
Total number of properties declared no longer danger centers -----	130
Total number of properties now considered dangerous--	None

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 4

JANUARY, 1925

No. 4

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 8, 1900.

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# Southern Blight on Soybeans: A New Disease in Mississippi

*By J. M. Wallace, Assistant Plant Pathologist*

During the summer of 1924, Southern blight, *Sclerotium rolfsii*, was epidemic over the state on soybeans. The first report of this disease was received on August 18. On that date, the writer, accompanied by D. C. Neal, Plant Pathologist of the Experiment Station, made a visit to the infected field, and there we observed a probable loss of 30 per cent of the soybean crop. In this particular field the soybeans were planted in the same rows with corn. The corn and healthy beans had been cut and only the dead bean plants were left standing. It is possible and very probable that many of the bean plants which appeared to be healthy at the time of cutting were also infected and had they been left for a longer time they would have very likely died, thereby making the percentage of infection much higher than was observed.

Plants affected with Southern blight lose color, wilt, and may die. Plants sometimes wilt during the day and appear to recover the following night but after a day or so they will turn yellow and dry up. The fungus is found usually around the base of the stem where it forms a white mycelial growth and a large number of spherical, yellow or brown sclerotia, which very closely resemble mustard seed and which are diagnostic of the disease. (See figure 1.) The causal fungus has been found on numerous hosts, especially in the South and at least as far north as central Illinois. Besides affecting soybean, the fungus has been identified on beet, bellflower, bean, chrysanthemum, cowpea, cauliflower, cabbage, carrot, daphne, eggplant, fig, hydrangea, Irish potato, muskmelon, morning-glory, Japanese fiber plant, watermelon, pinks, rhubarb, violet, squash, sugar-cane, grasses,

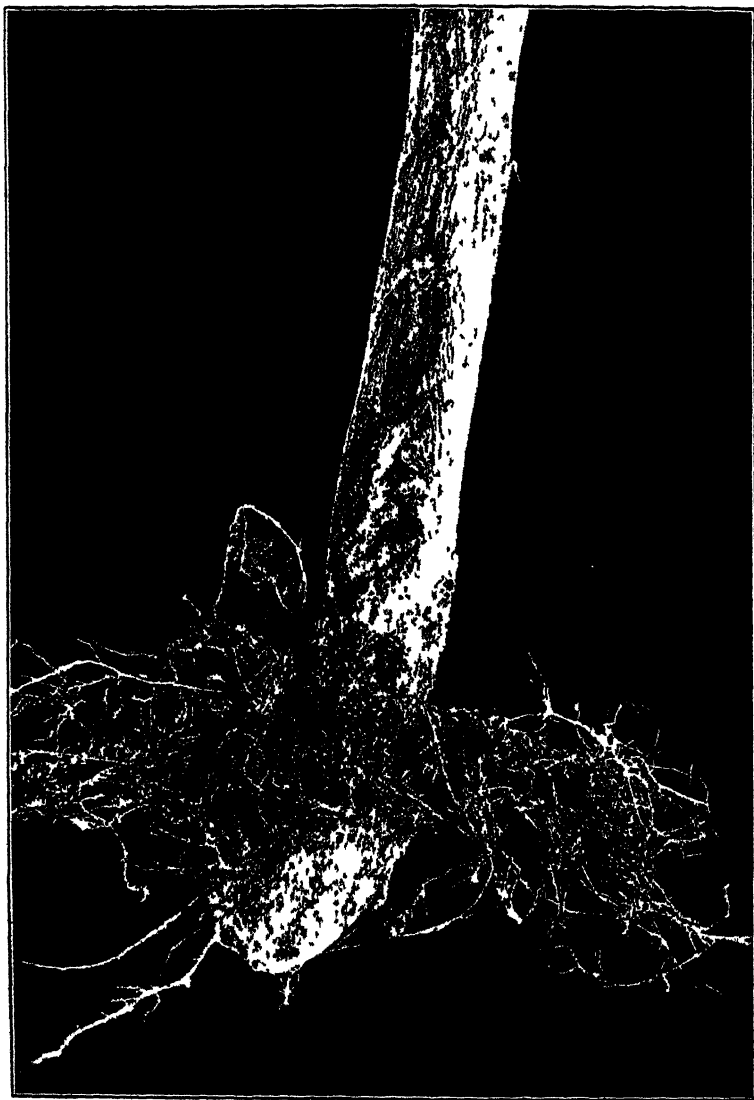


Fig. 1.—Base and roots of soybean plant infected with Southern blight, (*Sclerotium rolfsii*.) The sclerotia, which resemble mustard seed, can be seen scattered over the white mycelial growth.

numerous weeds, and probably other hosts. Velvet beans are also said to be attacked by the disease in Florida.

Once a plant is infected with Southern blight there is no control, preventive measures being the only means of control for the disease. Crop rotation is advised but so far as known there has been no work done to determine how long the fungus will live in soil which is kept idle, or free of susceptible crops. Fortunately this disease has not been reported on any of our common grain crops and naturally we should select a grain crop to be grown on infected soil. Corn, rye, or oats should be planted on the infected fields. No record has been found of the number of years that it will be necessary to plant immune crops on the infected soil in order to completely starve out the fungus. If possible it would be best to keep the highly susceptible crops off the infected fields for several years.

Until more work is done with this disease on soybean, no recommendations can be given as to which variety of bean shows the most resistance to the disease. Mr. C. B. Anders, Assistant Director of the Branch Experiment Station of Raymond, Mississippi, and Mr. H. H. Wedgworth, Inspector of the State Plant Board, made the following readings relative to the amount of Southern blight in the experimental plots of beans at their station last summer.

Occurrence of Southern blight, *Sclerotium rolfsii*, on the leading varieties of soybeans.

### LAREDO

Row	Plot No. 1 No. plants		Plot No. 5 No. plants		Plot No. 9 No. plants	
No.	Healthy	Diseased	Healthy	Diseased	Healthy	Diseased
1	42	7	44	8	42	12
2	42	10	54	11	38	14
3	40	14	52	16	32	14
4	45	11	60	10	36	13
5	45	12	48	11	36	13
	<hr/> 214	<hr/> 54	<hr/> 258	<hr/> 66	<hr/> 184	<hr/> 66



**OOTOTAN**

	Plot No. 2		Plot No. 6		Plot No. 10	
1	46	8	46	8	47	8
2	43	10	48	12	64	5
3	44	12	40	14	46	12
4	48	5	55	7	46	13
5	47	10	42	13	56	5
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	228	45	231	54	259	43

**BILOXI**

	Plot No. 3		Plot No. 7		Plot No. 11	
1	23	7	34	15	20	8
2	22	3	36	16	22	4
3	30	6	35	28	24	4
4	33	5	45	21	31	4
5	33	6	40	25	30	5
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	146	27	190	105	127	25

**MAMMOTH YELLOW**

	Plot No. 4		Plot No. 8		Plot No. 12	
1	69	13	46	30	58	6
2	76	13	43	13	65	7
3	62	11	47	16	58	15
4	70	14	40	30	63	14
5	61	16	42	18	73	11
	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>	<hr/>
	338	67	218	107	317	53

**Average percentage of infection**

Laredo	-----22.09	Biloxi	-----25.32
Oototan	-----16.57	Mammoth Yellow	-----20.63

These plots were not planted for testing the resistance of the four varieties to Southern blight but owing to the heavy infection the readings were made. The plots were not artificially inoculated but all infection was natural. So far as known, no Southern blight had been observed on these plots on any crop during previous years.

We see from the above table that Oototan showed more resistance to the disease than any other variety under test,

having 16.57% infection. Mammoth Yellow and Laredo were next highest respectively with the percentages of 20.63 and 22.09. Biloxi showed the least resistance with 25.32% infection. No definite conclusions can be drawn from these readings, as it would be unsafe to accept the results of only one season. A more extensive experiment is planned for this season and at the end of the year we hope to be able to have information regarding the resistance and susceptibility that will be of value to all growers of soybeans.

The past season was extremely dry and it might be that the epidemic of Southern blight was due to that fact. However, more time must be given to the study of this disease before we can say definitely what part climatic conditions, soil, and other factors play in the prevalence of Southern blight on soybean.

### COTTON UNDER BOLL WEEVIL CONDITIONS

*(By E. B. Ferris, in Charge Branch Experiment Station, Poplarville, Mississippi.)*

One of the most important factors in growing cotton with the boll weevil is the use of large fields rather than small patches. The boll weevil has undoubtedly done a good deal less damage in the Mississippi Delta than in other parts of the state, and I think this is due very largely to the fact that the Delta fields are so much larger than are the fields in the hill sections of the state. The writer owns a farm of several hundred acres, a part of which is worked in rather large fields, while other parts extend into small valleys surrounded by growing timber. This farm is leased to a number of small negro tenants, and our experience has been that the tenants whose cotton is grown in the large fields always pay their accounts, while those tenants who work the smaller patches frequently fail to pay expenses.

The boll weevil leaves the cotton fields in the fall and spends the winter in nearby timber or anything that gives them protection against the cold. The first of them, as they come out in the spring, settle in the nearest cotton and

spread from this further into the open fields. A few days' difference in the time of complete infestation in mid-summer may easily make the difference between a reasonably good cotton crop and practically no crop at all. The smallest of South Mississippi farms usually have fields of sufficient size that much could be accomplished by planting cotton as far away from surrounding timber as possible. Many of these fields could be greatly enlarged by cutting out small patches of timber even though the land thus cleared might be too rolling for successful cultivation, in which case such land should be devoted to crops that do not require regular cultivation.

On the writer's individual farm the effort is made to confine the planting of cotton to fields well away from the woodland and to use small patches for growing crops other than cotton. We feel that it is hard to lay too much stress on this one factor in cotton production. It is something that adds practically nothing to the cost of growing the cotton and certainly increases the profit therefrom.

In hunting for boll weevils early in the year, one seldom finds them in the middle of the field, but always around the edges and particularly near farm buildings, trash piles, ditch banks, or timber of any description. At the Experiment Station, we made it a rule to destroy the cotton stalks in the fall as soon as possible after the cotton is picked. In 1924, all cotton had been picked here by the first of September and as soon thereafter as possible our fields were gone over with a stalk cutter, oats were sown, and these ploughed in with a disc harrow. This practically stopped all further growth of cotton, no more squares were formed, and, therefore, no boll weevils were bred after the ploughing was done.

Although the weather remained practically dry up to December 8, many of our neighbors' fields, not so treated, continued to make a few squares and bolls, and wherever the weevils deposited their eggs in young bolls their larvae matured regardless of the drought, and are present now in their hibernating quarters for the succeeding year's work. We believe the early destruction of the cotton in the fall

is practically as important as any one of the factors that enter into the successful production of cotton with the weevil present. We hear of many weevils having been found in this territory in cotton fields allowed to continue fruiting after the main harvest, even though there has been so little rain that oats planted here early in September did not germinate until after the rain which fell on December 8—a condition extremely favorable to the complete destruction of the weevil and that has not been approached heretofore in over twenty-three years' experience in Pearl River County.

### 1500 ACRES POTATOES PASS INSPECTION

Fifteen hundred acres of sweet potatoes in Mississippi have passed the field inspections for stem rot and will be available as certified seed if the storage inspections are satisfactory. This acreage is well distributed over the State, though there are a few counties without a single certified sweet potato grower.

Chickasaw County heads the certified list with 50 growers, and with the largest certified acreage—175. This County also leads with the greatest number of large individual growers, having 6 with more than 10 acres each. The largest individual grower in the State is in Amite County, with 46 acres in sweet potatoes. However, Clarke, Forrest, Stone, and Tippah Counties also boast individual growers with 20 acres or more, while Adams, Choctaw, Chickasaw, Lafayette, Monroe, and Panola Counties have several ranging from 10 to 15 acres each.

On account of the extreme drouth this year, sweet potato yields have been low, and certified seed and plants are expected to find a ready sale next spring. Many of the certified growers sell seed only, while others specialize in the production of plants. Potatoes that have already passed the field inspection for stem rot will be inspected in storage for black rot, and again for the same disease after the plants are up on the beds. So many precautions are taken to prevent disease that the buyer of Mississippi certified seed potatoes and potato plants is assured of getting a product of the highest quality on the market.

## REPORT ON WILT-RESISTANT TOMATO SEED DISTRIBUTION IN MISSISSIPPI IN 1924.

*By D. C. Neal, Plant Pathologist.*

For a number of years the Department of Plant Pathology of the Mississippi Experiment Station has been engaged in a study of the various tomato diseases occurring in Mississippi. As a result of these studies, it has been established that tomato wilt is the most important parasitic disease of this crop in the State. In view of the fact that this disease has been found to infest the soil of so many gardens and fields in practically every county in the State, making the growing of ordinary varieties of tomatoes an uncertain venture, this department has given special attention for a number of years to developing varieties of tomatoes resistant to wilt. The results obtained with our selection work in our trial plats at the Central and Branch Stations were so encouraging over a period of years beginning in 1920, that it was decided to grow a considerable quantity of the best wilt-resistant selections during the season of 1923. Accordingly, the State Plant Board and Experiment Stations grew co-operatively during the summer of 1923 several pounds of Norton and Marvel tomato seed.

These seed were distributed gratis in January and February of 1924 in small quantities to people throughout the State for trial planting. Approximately 5,500 packets of seed were distributed.

It was the purpose in making the initial distribution to reach as many people as possible and request that they save seed from their healthy plants for their future needs as well as some for their neighbors. In this way it was hoped that the supply of seed could be quickly increased and a more general use made of them over the State as a means of controlling wilt.

When the seed were sent out early last year, each person was asked to submit a report at the close of the season giving the results obtained with the wilt resistant sample. At planting time each person was also asked to plant a few seed of ordinary commercial varieties in order to serve as a

basis of comparison with the wilt-resistant seed. The reports asked for included opinions as to quality of fruit, percent of wilt, and yielding qualities of these varieties as compared with commercial tomatoes. As was expected, many parties who obtained seed failed to send in reports. However, many did comply with this request, and several reports have been received from various sections of the State. These reports clearly reveal the fact that as a tomato for the home garden these varieties are entirely satisfactory for controlling wilt. Because of their high resistance to this disease, they continue to bear fruit, as a rule, until the vines are killed by frost, whereas ordinary varieties usually are killed outright when about two-thirds mature or else produce only a few clusters before succumbing to the disease.

Since the inauguration of the wilt-resistant seed distribution and the publicity that it has received, many seedsmen, and plant growers in Mississippi and adjoining states have realized the value of these seed and are now offering for sale seed and plants of wilt-resistant tomatoes.

A few of the reports as to the performance of these varieties when planted on wilt infested soil are given below:

"In reply to your letter of June 25th in regard to what success I had with your Norton wilt-resistant tomato seed, will say that I planted them on a plot badly infested with wilt or blight and that the tomatoes are as green as a bay tree and loaded with fruit, making fruit to the top. This without my using any spray on them or pruning, except to stake and tie them. On this plot of ground could never raise any tomatoes after the first year with non-resistant kind. Am very much pleased as it enables me to plant tomatoes in a garden.

"A. BERGER, Port Gibson, Miss.

"July 16, 1924."

"In order to give the plants the proper test, I put in parallel rows other plants that were not of the non-wilting variety. The summer was so dry that I think all would have perished of drought if I had not irrigated with a hose, run-

ning the hydrant water between the rows so that it would reach the roots of the plants. The result was some of the wilting varieties wilted and were at once pulled up and removed, but the non-wilting tomatoes remained alive and vigorous and were very prolific, and I had the fruit of same on my table until the severe frosts of December had killed everything in my garden. The fruitage for the most part was large and fine, and I gave some of the best to some of my friends and neighbors in order that they might obtain seed for 1925 planting, and saved plenty of seed for my own use.

"J. B. BOOTHE, Lexington, Miss.

"Jan. 13th, 1925."

"Complying with your request in regard to the tomato seed you sent me will say they are the finest tomatoes I have ever seen. The vines are as green as can be and are full of young tomatoes now. Have never seen as fine crop as have grown this year. The hot weather did not seem to set them back at all.

"W. H. FUNCHER, Sr., Lexington, Miss.

"October 13, 1924."

"I am highly pleased with the packet of Norton wilt-resistant tomato seed you sent me and I have saved seed for myself and others. Please accept my thanks for they sure did do well for the long drouth. The Norton's were the only kind I had this year and not a single one blighted. I had all the tomatoes that I could use and canned a lot.

"MRS. J. P. HUNT, Ackerman, Miss.

"October 27, 1924."

"In reference to the wilt-resistant tomato seed which you were kind enough to send me last February, I am glad to report, that in spite of exceptionally dry weather, and some loss by dry rot, my little crop of tomatoes is fine. The flavor particularly is excellent. Fruit good size—and very large healthy vines. I have shared with my neighbors and they all praise the very fine flavor.

"H. A. GENUNG, Gulfport, Miss.

"July 14, 1924."

"The only time I have had tomatoes to mature and furnish fruit in this garden in 10 or 12 years. Every year I have tried different commercial varieties and cultivated every way imaginable only to lose all plants before fruit ripened. This year frost caught my vines full of tomatoes.

"T. B. HOLLOMAN, M. D., Itta Bena, Miss.

"November 14, 1924."

## BAGWORM INJURY PROBABLE

*By H. Gladney*

Last year the bagworm, *Thyridopteryx ephemeraeformis*, did considerable damage in many parts of Mississippi by defoliating and ultimately killing valuable trees. This year the damage may be expected to be even greater as the egg supply this winter greatly exceeds that of last winter. People with collections of valuable trees and shrubs should begin control measures now in order to avert the ravages of this pest next spring.

The bagworm overwinters in the egg stage within the old female bags which are now noticeable clinging to the twigs of trees that last summer furnished food for the worms. The bags are from one to two inches long and are ornamented with fragments of foliage upon which the larvae fed. In the late spring the young hatch from these eggs, make their way to the leaves, and immediately begin to feed and to construct bags for themselves. They spin a large amount of silk and attach to it, for additional strength and protection, bits of leaf or of twig, evidently attempting to disguise the nature of the case as well as to strengthen it. The larva is remarkably soft-bodied, except for its head and strong thoracic plate, and it is necessary that the soft-bodied abdomen should have some protection.

### Control Measures.

The bagworm feeds on both deciduous and evergreen trees and shrubs, apparently preferring arbor-vitae to other plants. From the deciduous trees and badly defoliated evergreens, the bags can very profitably be gathered by hand



during the winter and burned. This destroys the egg supply for the following spring. On evergreens that are not completely defoliated, hand picking is very slow and tedious, and spraying is more effective.

### Spraying.

Satisfactory results have been obtained on evergreens by spraying with one pound powdered lead arsenate to 50 gallons water. In some cases to enhance the adhesiveness of

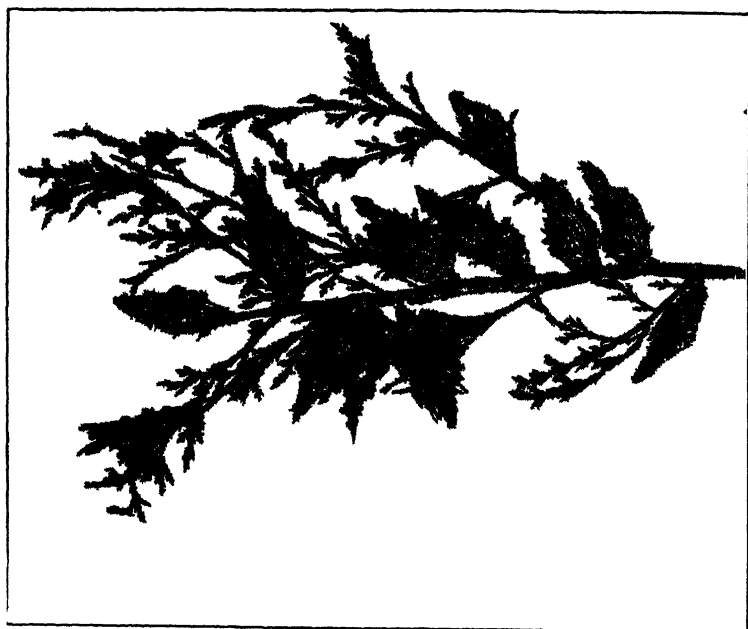


Fig. 2—Bagworms on Twig of Arbor-Vitae.

the solution one pound of resin fish-oil soap is added. A stronger spray, using 2 pounds to 50 gallons of water, is sometimes advised on evergreens, since the bagworms do not feed in masses and the foliage that is eaten should have plenty of poison on it. The spray should be applied in the late spring as soon as the eggs are observed hatching, or a few days thereafter. If the first application does not give satisfactory results, a second should be made in a few days.

## MISSISSIPPI FARMERS FAVORED Bean Pest Prefers Other Sections of Country.

*By Clay Lyle*

Farmers throughout Mississippi are congratulating themselves on the fact that the destructive Mexican bean beetle, *Epilachna corrupta*, which was discovered near Birmingham, Alabama, in July, 1920, shows little desire to spread westward, having reached only six counties in north-east Mississippi. This is in marked contrast to its movement north and east, where great stretches of territory have been covered in a single year, as shown on the accompanying map. Already the beetle has invaded practically the whole Atlantic seaboard, reaching Pennsylvania, Virginia, West Virginia, and all intervening states and causing justifiable alarm to the bean growers of New York. Pushing northward it has infested Tennessee, Kentucky, Indiana, and Ohio, and is expected in the commercial bean areas of Michigan in a short time.

Itawamba was the first known infested county in Mississippi, R. B. Dean, Inspector of the State Plant Board, discovering the beetle in May, 1923. In June of the same year it was found in Tishomingo County near the Alabama line. During 1923 this pest was found on a total of 13 properties in these two counties. During 1924 the bean beetle has been found on a number of other properties in Itawamba and Tishomingo Counties, and also in Alcorn, Lee, Prentiss, and Monroe Counties. Records show that it has been reported from 67 farms in the state to date. It is probable that the beetle will gradually spread westward over the State, but the loss will be much less than if Mississippi had been covered with the same rapidity as states to the north and east.

Though the State Plant Board has devoted as much time to scouting for this pest as could be spared from other work, it is probable that the bean beetle occurs on a number of farms where it has not yet been reported. In order to secure an accurate record of its spread, and also to provide every farmer with the latest recommendations for controlling the bean beetle, the Plant Board is urging farmers over the State, especially in the eastern half, to send in for examination specimens of any suspicious insects attacking beans. The adult is a beetle about one-fourth inch long, varying

from yellowish-brown to copper color, with eight black spots on each wing cover. The eggs, larvae, and pupae are orange-yellow.

Thus far the damage reported in Mississippi has not been as serious as occurs in the badly infested sections of

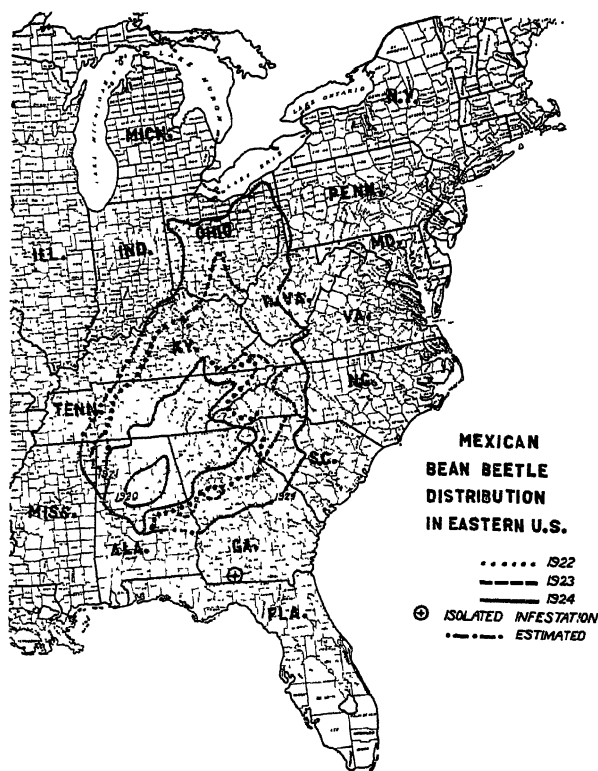


Fig. 3.—Distribution of Mexican Bean Beetle in Eastern United States. (U. S. Bureau of Entomology.)

some other states, and the chief control measures have consisted in picking off and destroying all beetles, immature stages, and egg clusters. It is probable that in many cases other control measures will be necessary, and among these, dusting with a mixture of 1 part calcium arsenate and 9 parts slaked lime, applied so as to reach the under sides of the leaves, has been the simplest effective measure used. Spraying with magnesium arsenate at the rate of 1 pound to 50 gallons water is also recommended.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....	Editor
D. C. NEAL, Plant Pathologist .....	Associate Editor
HUNTER H. KIMBALL.....	Associate Editor
CLAY LYLE.....	Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## PLANT CERTIFIED IRISH POTATO SEED

Every Mississippi farmer who expects to grow Irish potatoes this spring should by all means secure certified seed. Unless this is done, heavy yields cannot be expected on account of mosaic, a disease which crinkles and dwarfs the plants, greatly reducing the yield. This disease is widespread and has caused so much damage that many farmers have almost quit trying to grow Irish potatoes. In Louisiana, it was threatening to ruin the production of Irish potatoes for early markets, when the industry was saved through the use of certified seed, as advocated by the Horticultural Extension Department of Louisiana State University. In Mississippi, Louisiana, and many other states, yields have been so greatly increased by using certified seed that there is no question of the value of this practice. In most cases the price of certified seed is but little, if any,

higher than for common, uncertified seed, since all our seed potatoes are shipped here from northern states anyhow. At any rate, the increased yield will be worth many times the increase in cost.

Most of the certified seed Irish potatoes used in the South are produced in Nebraska, Wisconsin, Minnesota, and Maine, where they are certified under the supervision of the department of agriculture in each state. In most cases, three inspections are made and the certified product is very free from scab, mosaic, and other diseases.

Any Mississippi farmer or seed dealer who desires to purchase certified seed potatoes should write to the State Plant Board for a list of certified growers in the above northern states. New seed must be ordered each year, as second-year potatoes are usually badly diseased and produce low yields.

### **NATIONAL FOULBROOD ERADICATION PLANNED.**

During the present session of Congress a bill will be introduced providing for a national campaign against American Foulbrood, the worst disease of bees. The moving spirit behind the bill is the American Honey Producers' League, a national organization of beekeepers. The following statement from the League Bulletin outlines the general plan for carrying out this work after the Federal appropriation has been made:

"The proposal is the uniting of the various apiary inspection services in the country in co-operation with the federal government, which would supply half the funds. The method of a thorough inspection and clean-up, county by county, which is proving so successful in a number of states, would be the one followed.

"Federal funds would be made available to the states as soon as their methods, the state appropriation, and the training of the inspectors was satisfactory to the federal department. Presumably the work would be started in areas in which there is the least foulbrood at present and extended to the more heavily infected sections later.

"Limitations would be provided against the shipment of bees on combs and used bee supplies into areas after they had been inspected and cleaned-up. The work in each area would be continued until no more disease could be discovered. In order to put this plan in effect some modifications in the laws of a number of states might be required. To be successful in cleaning up bee diseases in any area a state law must include at least the four following essentials:

1. Giving the inspectors access to bees whether the beekeeper objects or not.
2. Enabling the inspector to order treatment or destruction of infected colonies, and in case of refusal or neglect of the owner, to destroy or treat the bees himself.
3. Requiring beekeepers, at least upon orders from the inspector, to transfer any box or immovable-frame-hive colonies into movable frame equipment.
4. Some effective means of preventing the moving of diseased colonies."

Fortunately these essentials are already included in the Mississippi Bee Disease Act of 1920, and this state would be in position to receive Federal aid in this work as soon as the appropriation becomes available. The fact that American Foulbrood apparently has been eradicated in Mississippi already through the efforts of the State Plant Board, would give this state an additional claim for aid in making very thorough inspections in all sections in order to be absolutely certain that no disease remains.

In order that our senators and representatives may be fully informed of the value of this measure, Mississippi beekeepers should get in touch with them and emphasize its importance as soon as the bill is introduced. By means of newspaper articles, the Plant Board will endeavor to keep the beekeepers of the State informed about developments in regard to this measure.

**CITRUS CANKER SCOUTING REPORT****For the Period October 1, 1924, to December 31, 1924.**

Number of counties in the state which have at one time or another since 1916 shown canker -----	4
Number of counties showing canker October 1, 1924 to December 31, 1924 -----	0
Number of grove trees inspected October 1, 1924, to December 31, 1924 -----	7431
Number of nursery trees inspected October 1, 1924, to December 31, 1924 -----	287,142
Number of <i>C. trifoliata</i> inspected October 1, 1924, to December 31, 1924 -----	203,354
Total number of grove trees found infected June 1, 1916 to December 31, 1924 -----	3117
Total number of nursery trees found infected June 1, 1916, to December 31, 1924 -----	51167
Number of properties infected during 1916 -----	108
Number of properties infected during 1917 -----	47
Number of properties infected during 1918 -----	14
Number of properties infected during 1919 -----	4
Number of properties infected during 1920 -----	0
Number of properties infected during 1921 -----	1
Number of properties infected during 1922 -----	8
Number of properties infected during 1923 and 1924	0
Number of new properties infected during 1917 ----	12
Number of new properties infected during 1918 ----	1
Number of new properties infected during 1919-1920	0
Number of new properties infected during 1921 ----	1
Number of new properties infected during 1922 ----	8
Number of new properties infected during 1923-1924	0
Total number of properties found infected June 1, 1916, to December 31, 1924 -----	130
Total number of properties declared no longer danger centers -----	130

## REPORT OF NURSERY INSPECTOR

For Quarter Ending December 31, 1924

Number of nurseries inspected .....	122
Acreage in nurseries inspected .....	663.85
Amount of nursery stock inspected:	
Grafted and budded pecans .....	162,180
Seedling pecans .....	328,475
	<hr/>
Total pecans .....	490,655
Citrus trifoliata .....	859,800
Orange .....	88,320
Kumquat .....	812
Grapefruit .....	2,002
Lemon .....	350
	<hr/>
Total citrus .....	951,284
Apple .....	10,200
Pear .....	64,388
Peach .....	33,767
Plum .....	1,628
Fig .....	1,331
Grape .....	7,012
Persimmon .....	2,000
Strawberry .....	6,015,000
Mulberry .....	50
	<hr/>
Total fruit (citrus excluded) .....	6,135,376
Rose .....	206,150
Other ornamental .....	889,133
	<hr/>
Total ornamental .....	1,095,283
Grand total of plants inspected during quarter .....	8,672,598



**QUARANTINE INSPECTION REPORT****For Period October 1-December 31, 1924.***(Geo. F. Arnold, Quarantine Inspector)***Ships and vessels inspected:**

From foreign ports -----	4
From U. S. Ports -----	0
Total -----	4

**Arriving by land , express, freight, wagon, etc.:**

Passed -----	890
Treated and passed -----	0
Returned to shipper -----	6
Contraband destroyed -----	12
Total -----	908

**Arriving by mail:**

Passed -----	387½
Treated and passed -----	8
Returned to shipper -----	0
Contraband destroyed -----	5½

401

Grand Total of parcels inspected -----1309

**Number of parcels on hand December 31, 1924 pending determination as to final disposition -----**

ing determination as to final disposition -----	16
Total parcels passed -----	1277½
Total parcels treated and passed -----	8
Total parcels returned to shipper -----	6
Contraband destroyed -----	17½

Grand Total -----1309

# THE QUARTERLY BULLETIN

— OF THE

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 5

APRIL, 1925

No. 1

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

### **MEMBERS OF BOARD**

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**J. R. RICKS-----Director Agr. Exp. Stations, A. & M. College, Miss.**

**R. W. HARNED, Secretary -----Entomologist, A. & M. College, Miss.**

# The Mississippi Plant Act of 1918

(As Amended in 1920.)

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## CHAPTER 252.

### Senate Bill No. 505.

AN ACT to amend Chapter 219 of the laws of Mississippi of 1918, so as to include with the plants and plant products other things and substances that are or are likely to be or become infected or infested, and defining certain duties and powers of the chief entomologist and regulating the introduction into and transportation through the state.

SECTION 1. *Be it enacted by the Legislature of the State of Mississippi*, That chapter 219 of the laws of Mississippi of 1918 be and the same is hereby amended so as to read as follows:

SEC. 1. This act shall be known by the short title of "the Mississippi plant act of 1918."

SEC. 2. For the purpose of this act, the following terms shall be construed, respectively, to mean:

*Insect pests and diseases.*—Diseases and insect pests, injurious to plants and plant products of this state, including any of the stages of development of such diseases and insect pests.

*Plants and plant products.*—Trees, shrubs, vines, forage and cereal plants, and all other plants; cuttings, grafts, scions, buds, and all other parts of plants and fruit, vegetables, roots, bulbs, seeds, wood, timber, and all other plant products.

*Places.*—Vessels, cars and other vehicles, buildings, docks, nurseries, orchards and other premises, where plants and plant products are grown, kept or handled.

*Persons.*—Individuals, associations, partnerships and corporations.

Words used in this act shall be construed to import either the plural or the singular, as the case demands.

SEC. 3. There is hereby created and established a state plant board, hereinafter called the board, composed of three members as follows: The commissioner of agriculture, the director of the state agricultural experiment stations, and the chief entomologist of the agricultural and mechanical college.

SEC. 4. The board is hereby empowered to conduct such inspections and promulgate and enforce such quarantine regulations as may be necessary in carrying out the provisions of this act.

SEC. 5. These inspections and the quarantine enforcement shall be conducted under the direction of the board by the said chief entomologist of the Mississippi agricultural and mechanical college and such assistants as may become necessary. It shall be the duty of the entomologist to make recommendations to the board regarding quarantines and regulations.

SEC. 6. For the purpose of carrying out the provisions of this act, the board may employ, prescribe the duties of, and fix the compensation of, such inspectors and other employees as it may require and incur such expenses as may be necessary, within the limits of appropriations made by law. It shall cooperate with other departments, boards and officers of this state and of the United States as far as practicable.

SEC. 7. The board shall keep itself informed as to known varieties of insect pests and diseases, the origin, locality, nature and appearance thereof, the manner in which they are disseminated, and approved methods of treatment and eradication. The board, in its rules and reg-

ulations made pursuant to this act, shall list the insect pests and diseases of which it shall find that the introduction into, or the dissemination within, this state should be prevented in order to safeguard the plants and plant products of this state, together with the plants and plant products and other things likely to become infested or infected with such insect pests and diseases. Every such insect pest and disease listed, and every plant and plant product and other thing infected therewith, is hereby declared to be a public nuisance. Every person who has knowledge of the presence of any insect pest or disease listed, as required by this section, in the rules and regulations made pursuant to this act, in or upon any place, shall immediately report the same to the board or an inspector thereof, giving such detailed information relative thereto as he may have. Every person who deals in or engages in the sale of plants and plant products or other things infested or infected, or likely to be or become so shall furnish to the board or its inspectors, when requested, a statement of the names and addresses of the persons from whom and the localities where he purchased or obtained such plants and plant products, and other things infested or infected, or likely to be or become so.

SEC. 8. The board shall from time to time make rules and regulations for carrying out the provisions and requirements of this act, including rules and regulations under which its inspectors and other employees shall (a) inspect places, plants and plant products, and things, and substances used or connected therewith, (b) investigate, control, eradicate and prevent the dissemination of insect pests and diseases, and (c) supervise or cause the treatment, cutting and destruction of plants and plant products and other things infested or infected therewith. The inspectors and employees employed by the board shall have authority to carry out and execute the regulations and orders of the said board and shall have authority under direction of the board to carry out the provisions of this act.

SEC. 9. Whenever such inspection disclosed that any places, or plants or plant products or things or substances

used or connected therewith, are infested or infected with any insect pest or disease listed as a public nuisance, as required by section seven. in the rules and regulations made pursuant to this act, written notice thereof shall be given the owner or other person in possession or control of the place where found and such owner or other person shall proceed to control, eradicate or prevent the dissemination of such insect. pest or disease, and to remove, cut or destroy infested and infected plants and plant products, or things or substances used or connected therewith, within the time and in the manner prescribed by said notice or the rules and regulations made pursuant to this act. Whenever such owner or other person cannot be found, or shall fail, neglect or refuse to obey the requirements of said notice and the rules and regulations made pursuant to this act, such requirements shall be carried out by inspectors or other employees of the board.

SEC. 10. It shall be unlawful for any person to bring or cause to be brought into this state any plant or plant product or other thing listed as required by section seven, in the rules and regulations made pursuant to this act, unless thereby plainly and legibly marked thereon or affixed thereto, or on or to the car or other vehicle carrying, or the bundle, package or other container of the same, in a conspicuous place, a statement or a tag or other device showing the names and addresses of the consignors or shippers and the consignee or person to whom shipped, the general nature and quantity of the contents. and the name of the locality where grown or shipped together with a certificate of inspection of the proper official of the state, territory, district or country from which it was brought or shipped, showing that such plant or plant product or other thing or substance was found or believed to be free from insect pests and diseases, and any other information required by the board.

SEC. 11. It shall be unlawful for any person to sell, give away, carry, ship or deliver for carriage or shipment within this state, any plants or plant products or other thing or substance listed, as required by section seven in the rules and regulations made pursuant to this act, unless such plants

or plant products or other thing or substance have been officially inspected and a certificate issued by an inspector of the board stating that the said plants or plant products or other thing or substance have been inspected and found to be apparently free from insect pests and diseases, and any other facts provided for in the rules and regulations made pursuant to this act. For the issuance of such certificate, the board may require the payment of a reasonable fee to cover the expense of such an inspection and certification: provided, however, that if such plants or plant products or other thing or substance were brought into the state in compliance with the requirements of section 10, the certificate required by that section may be accepted in lieu of the inspection and certificate required by this section in such cases as shall be provided for in the rules and regulations made pursuant to this act. If it shall be found at any time that a certificate of inspection issued or accepted pursuant to the provisions of this section is being used in connection with plants and plant products or other things or substance which are infested or infected with insect pests or disease listed as required by section seven in the rules and regulations made pursuant to this act, its further use may be prohibited, subject to such inspection and other dispositions of the plants and plant product involved as may be provided for by the board. All monies collected by the board under this section or under section nine or sixteen shall be deposited in the state treasury to the credit of the general revenue fund receipts.

SEC. 12. Any person in this state who receives from without this state any plant or plant product, or other thing or substance as to which the requirements of section ten have not been complied with, or who receives any plant or plant product, or other thing or substance, sold, given away, carried, shipped, or delivered for carriage or shipment within this state as to which the requirements of section eleven have not been complied with, shall immediately inform the board or an inspector thereof and isolate and hold the said plant product or other thing or substance unopened or unused subject to such inspection and other disposition as may be provided for by the board.



SEC. 13. Whenever the board shall find that there exists outside of this state any insect pest or disease, and that, in order to safeguard plants and plant products in this state, its introduction into this state should be prevented, the board shall give public notice thereof, specifying the plants and plant products infested or infected or likely to become infested or infected therewith, and the movement of such plants or plant product or other thing or substance into this state from the infested locality, designated in said public notice mediately or immediately shall thereafter be prohibited until the board shall find that the danger of the introduction into this state of such insect pests or diseases from such locality has ceased to exist, of which the board shall give public notice.

SEC. 14. Whenever the board shall find that there exists in this state, or any part thereof, any insect pest or disease, and that its dissemination should be controlled or prevented, the board shall give public notice thereof, specifying the plants or plant products or other thing or substance infested or infected or likely to become infested or infected therewith, and the movement, planting or other use of any such plant or plant product, or other thing or substance specified in such notice as likely to carry and disseminate such insect pest or disease, except under such conditions as shall be prescribed by the board as to inspection, treatment and disposition, shall be prohibited within such area as may be designated in said public notice until the board shall find that the danger of the dissemination of such insect pest or disease has ceased to exist, of which the board shall give public notice.

SEC. 15. For the purpose of carrying out the provisions and requirements of this act, and of the rules and regulations made, and notices given, pursuant thereto, the board and its inspectors and employees shall have power to enter in or upon any place, and to open any bundle, package or other container containing or thought to contain plants or plant products.

SEC. 16. Any person affected by any rule or regulations made, or notice given, pursuant to this act, may have

a review thereof by the board for the purpose of having such rule, regulation or notice modified, suspended or withdrawn. Such review shall be allowed and considered and the cost thereof fixed, assessed, collected and paid in such manner and in accordance with such rules and regulations as may be prescribed by the board.

SEC. 17. Any person who shall violate any provisions or requirements of this act, or of the rules and regulations made or of any notice given pursuant thereto or shall forge, counterfeit, deface, destroy or wrongfully use any certificate provided for in this act or in the rules and regulations made pursuant thereto, shall be deemed guilty of a misdemeanor and upon conviction thereof shall be punished by a fine of not more than five hundred dollars, or by imprisonment for not more than six months or by both such fine and imprisonment at the discretion of the court having jurisdiction. Said plant board shall have power and authority to enforce its rules, ordinances and regulations in any court of competent jurisdiction by civil, as well as criminal proceedings, and if the remedy to be pursued be by writ of injunction, no court of this state shall have right previous to a trial upon the merits to set aside such writ on bond. It shall be the duty of the attorney general, district attorneys and county attorneys to represent said plant board whenever called upon to do so. Said plant board in the discharge of its duties and the enforcement of the powers herein delegated, may send for books and papers, administer oaths, hear witness, etc., and to that end it is made the duty of the various sheriffs throughout the state to serve all summons and other papers upon the request of said plant board.

SEC. 18. In construing and enforcing the provisions of this act, the act, omission or failure of any official, agent or other person acting for or employed by any association, partnership, or corporation within the scope of his employment of office shall, in every case, also be deemed the act, omission or failure of such association, partnership or corporation as well as that of the person.

SEC. 19. That the board or any of its inspectors or employees shall be a proper party in any court of equity to effectively carry out any of the provisions of this act when an injunction would be a proper remedy.

SEC. 20. That this act shall not be so construed or enforced as to conflict in any way with any act of Congress regulating the movement of plants or plant products in interstate or foreign commerce.

SEC. 21 (a) That by virtue of the powers conferred by this act and for the purpose of protecting the plant life and plant products of this state in the circumstances herein set forth, the said board may prevent and prohibit the introduction into the state for the purpose of transportation through the state of any such plants or plant products or other thing or substance hereinbefore mentioned to the same extent and for the same purpose and with the same authority that is provided in section thirteen hereof with reference to the introduction of the same into this state.

(b) That said board for the same purposes and in the same manner and with the same authority may prohibit and prevent the introduction into or the transportation through the state of any such plants and plant products or other thing or substance except when contained in such container, car, boat, or vehicle and shall prevent the escape or waste of any part of the same while being introduced into or transported through the state, and may likewise prohibit and prevent the opening of such container, car, boat, or vehicle containing such plant or plant product or other thing or substance within the state.

SEC. 22. If any section or part of a section of this act shall for any cause be held unconstitutional, such fact shall not affect the remainder of this act.

SEC. 23. All acts or parts of acts inconsistent with the provisions of this act are repealed.

SEC. 24. That this act shall take effect upon its passage and approval by the governor, or upon its becoming a law without his approval.

Approved April 3, 1920.

# The Mississippi Bee Disease Act of 1920

## CHAPTER 209.

### House Bill No. 648.

---

AN ACT to prevent the introduction into and dissemination within the state of Mississippi of contagious and infectious diseases of honey bees; providing for the eradication of bee diseases; authorizing the State Plant Board of Mississippi to make rules and regulations for carrying out the provisions of this act; and prescribing a penalty for violations.

SECTION 1. Be it enacted by the Legislature of the State of Mississippi: This act shall be known by the short title of "The bee disease act of 1920."

SEC. 2. All honey bees shipped or moved into the state of Mississippi shall be accompanied by a certificate of inspection signed by the state entomologist, state apiary inspector or corresponding official of the state or county from which such bees are shipped or moved. Such certificate shall certify to the apparent freedom of the bees and their combs and hives, from contagious and infectious diseases and must be based upon an actual inspection of the bees themselves within a period of sixty days preceding the date of shipment; provided, that when honey bees are to be shipped into this state from other states or countries wherein no official apiary inspector or state entomologist is available, the State Plant Board of Mississippi through its chief executive officer, may issue permit for such shipment upon presentation of suitable evidence showing such bees to be free from disease; and provided, further, that the provisions of this section shall not apply to shipments of live bees in wire cages, when without combs or honey.

SEC. 3. The State Plant Board of Mississippi, created by chapter 219, laws of 1918, shall have full and plenary power to deal with American and European foul brood, Isle of Wight disease, and all other contagious or infectious diseases of honey bees which, in its opinion, may be prevented, controlled or eradicated; and shall have full power and is hereby authorized to make, promulgate and enforce such rules, ordinances and regulations and to do and perform such acts, through its agents or otherwise, as in its judgment may be necessary to control, eradicate or prevent the introduction, spread or dissemination of any and all contagious diseases of honey bees as far as may be possible and all such rules, ordinances and regulations of said Plant Board shall have the force and effect of law.

SEC. 4. The State Plant Board, its agents and employees, shall have authority to enter any depot, express office, storeroom, warehouse or premises for the purpose of inspecting any honey bees or beekeeping fixtures or appliances therein or thought to be therein, for the purpose of ascertaining whether said bees or fixtures are infected with any contagious or infectious disease or which they may have reason to believe have been or are being transported in violation of any of the provisions of this act.

The said board through its agents or employees, may require the removal from this state of any honey bees or beekeeping fixtures which have been brought into the state in violation of the provisions of this act, or if finding any honey bees or fixtures infected with any contagious or infectious disease or if finding that such bees or fixtures have been exposed to danger of infection by such diseases, may require the destruction, treatment or disinfection of such infected or exposed bees, hives, fixtures or appliances.

SEC. 5. The shipment or movement into this state of any used or second-hand bee hives, honey combs, frames or other beekeeping fixtures is hereby prohibited except under such rules and regulations as may be prescribed by the State Plant Board in accordance with section 2 of this act.

SEC. 6. Any person, firm or corporation violating any of the provisions of this act or of the rules or regulations of the State Plant Board adopted in accordance with the provisions of this act shall be deemed guilty of a misdemeanor and upon conviction shall be punished by a fine of not more than five hundred dollars or by imprisonment for not more than six months in the county jail.

SEC. 7. All laws and parts of laws inconsistent with the provisions of this act are hereby repealed.

SEC. 8. This act shall take effect and be in force from and after its passage.

Approved April 3, 1920.

# Rules and Regulations Made By The State Plant Board Pursuant To The Mississippi Plant Act of 1918

(As Amended in 1920).

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RULE 1. Under the provisions of the Mississippi Plant Act of 1918, (as amended, in 1920), the State Plant Board of Mississippi, in accordance with Section 7, of said Act, does declare the following insects and diseases, and each and every plant and thing infested or infected therewith, to be public nuisances.

### Insects and Plants Likely to Become Infested.

Alfalfa Weevil (*Phytonomus posticus*) Alfalfa.

Brown-Tail Moth (*Euproctis chrysorrhoea*).—Apple, apricot, ash, beech, cherry, elm, grape, maple, oak, peach, pear, plum, quince, rose, and many other trees and plants.

Cotton Square Weevil (*Anthonomus vestitus*).—Cotton.

European Corn Borer (*Pyrausta nubilalis*).—Favorite food plant is corn, but also feeds on almost any succulent plant.

Gypsy Moth (*Porthetria dispar*).—Apple, beech, cherry, elm, gum, hickory, maple, oak, pine, pear, willow, and many other trees and plants.

Japanese Beetle (*Popillia japonica*).—Feeds on a large number of fruit, shade and timber trees, small fruit, and ornamental plants, truck and field crops and weeds.

Japanese Camphor Scale (*Pseudaonidia duplex*).—Camphor, rose, oak, elm, mulberry, honeysuckle, pecan, peach, pear, and numerous other trees and plants.

Mediterranean Fruit Fly (*Ceratitis capitata*).—Apple, apricot, bean, citrus, eggplant, fig, grape, Japanese persimmon, peach, red peppers, tomato and other plants.

Mexican Orange Maggot or Morelos Fruit Worm (*Anastrepha (Trypeta) ludens*).—Guava, mango, orange, peach, plum, sapodilla, sweet lime.

Pink Bollworm (*Pectinophora gossypiella*).—Cotton.

Spiny Citrus White Fly (*Aleurocanthus woglumi*).—Avocado, citrus, coffee, guava, mango, and other plants.

West Indian Sweet Potato Weevil (*Euscepes batatae*).—Sweet potato.

### Diseases and Plants Likely to Become Infected.

Brown Rot (*Pythiacystis citrophora*).—Lemons, oranges.

Citrus Canker (*Pseudomonas citri*).—Grapefruit, kumquat, lemon, lime, sweet orange, trifoliate orange, and other citrus plants.

Potato Wart Disease.—Irish potatoes.

RULE 2. The following insects, pests and diseases are hereby declared to be especially injurious and are declared to be insects, pests and diseases, which should be controlled and their dissemination prevented, within the intent and meaning of Section 14 of the Mississippi Plant Act of 1918 (as amended in 1920).

Insect, Pest, or Disease	Plants Likely to Become Infested or Infected
Argentine Ant ( <i>Iridomyrmex humilis</i> )	Fig, orange.
Black Rot of Sweet Potato ( <i>Sphaeronema fimbriatum</i> )	Sweet potato.
Blight ( <i>Bacillus amylovorus</i> )	Apple, Loquat, Pear.
Blue-green Citrus Beetles ( <i>Pachnaeus opalus</i> , <i>P. distans</i> , <i>P. litus</i> , and <i>P. azureus</i> )	Citrus
Bundle Blight ( <i>Pseudomonas vascularum</i> )	Sugar Cane
California Red Scale, ( <i>Chrysomphalus aurantii</i> )	Citrus, Rose.
Camphor Thrips ( <i>Cryptothrips floricola</i> )	Camphor
Cane Leaf-hopper ( <i>Perkinsiella saccharicida</i> )	Sugar Cane
Cane Sharpshooter ( <i>Delphacodes saccharivora</i> )	Sugar Cane
Chaff Scale ( <i>Parlatoria pergandii</i> )	Citrus, Camellia
Chestnut Bark Disease ( <i>Endothia parasitica</i> )	Chestnut

## Insect, Pest or Disease

Plants Likely to Become Infested  
or Infected

Chrysanthemum gall midge.

*(Diarthronomyia hypogaea)* ChrysanthemumCitricola Scale (*Coccus cit-* Citrus, Elm, Nightshade,  
*ricola*) ----- Pomegranate, Walnut.Citrus Mealybug (*Pseudo-*  
*coccus citri*) -----Begonia, Bottle Bush, Citrus,  
Coleus, Cotton, English Ivy,  
Ferns, Fuchsia, Oleander,  
Peony, Poinsettia, Pumpkin,  
Wandering Jew, and other  
plants.Citrus Scab (*Cladosporium*  
*citri*) -----

Citrus

Cloudy-winged White-Fly

*(Dialeurodes citrifolii)* --- Citrus, Indian Laurel

Cottony - cushion Scale

*(Icerya purchasi)* ----- Acacias, Apple, Apricot, Care-  
less Weed, Castor Bean, Cit-  
rus, Coleus, Fig, Golden-rod,  
Grape, Locust, Magnolia, Mul-  
berry, Myrtle, Nettle, Night-  
shade, Peach, Pecan, Pepper,  
Pine, Pomegranate, Potato,  
Quince, Geranium, Roses,  
Spearment, Sunflower, Sweet  
Gum, Verbena, Walnut, Oak,  
Willow and other plants.Crown Gall (*Bacterium*  
*tumefaciens*) -----Apple, Grape, Oleander, Peach,  
Pear, Pecan, Plum, Privet,  
Quince, Raspberry, Rose and  
other plants.

Dictyospermum Scale

*(Chrysomphalus dictyos-*  
*permi)* -----Arbor-vitae, Camphor, Cape  
Jessamine, Citrus, Rose and  
other plants.

Insects, Plant Diseases	Fruit, Leaf, or Injured by Insects
Dieback of Pecan ( <i>Botryosphaeria berengeriana</i> )	Pecan
Florida Red Scale ( <i>Chrysomphalus aonidum</i> )	Banana, Begonia, Camphor, Citrus, Japonica, Oleander, Palm, Rose, Rubber Plant and other plants.
Florida Wax-scale ( <i>Ceroplastes floridensis</i> )	Citrus, Euonymus, Myrtle, Oleander, Pomegranate, Quince, and other plants.
Foot Rot ( <i>Phytophthora terrestris</i> )	Citrus
Gray Fungus Gummosis ( <i>Botrytis vulgaris</i> )	Lemon
Hemispherical scale ( <i>Saissetia hemisphaerica</i> )	Camellia, Ferns, Jasmine, Oleander, Orange, Sago Palm, and other plants
Little Peach	Peach
Long Scale ( <i>Lepidosaphes gloverii</i> )	Citrus, Magnolia fuscata, and other plants.
Mango Scale ( <i>Pulvinaria psidii</i> )	Citrus, Fig, Loquat, and other plants.
Melanose ( <i>Phomopsis citri</i> )	Citrus
Mexican Bean Beetle ( <i>Epilachna corrupta</i> )	Beans, Cowpeas, Soybeans, and other leguminous crops.
Mosaic Disease of Sugar Cane	Sugar Cane, Sorghum, Corn, Rice, Millet, and grasses.
Nursery Blight ( <i>Phyllosticta caryae</i> )	Pecan

Insect, Pest or Disease	Plants Likely to Become Infested or Infected
Oriental Peach Moth, ( <i>Laspeyresia molesta</i> )	Apple, Cherry, Peach, Pear, Plum, Quince.
Peach Rosette	Peach
Peach Tree Borer ( <i>Aegeria exitiosa</i> )	Peach, Plum.
Peach Yellow	Peach
Pear Thrips ( <i>Euthrips pyri</i> )	Pear.
Pecan Budworm ( <i>Proteoteryx deludana</i> )	Hickory, Pecan.
Pecan Case-bearer ( <i>Acrobasis nebulella</i> )	Hickory, Pecan, Walnut, Wild Crab.
Pecan Girdler ( <i>Oncideres cingulata</i> )	Hickory, Pecan, Persimmon, Rose, Walnut.
Pecan Rosette	Pecan.
Pecan Scab ( <i>Fusicladium effusum</i> )	Pecan.
Pecan-tree Borer ( <i>Sesia scitula</i> )	Chestnut, Dogwood, Hickory, Oak, Pecan.
Powdery Scab	Irish Potato.
Purple Mite ( <i>Tetranychus mytilaspidis</i> )	Citrus.
Purple Scale ( <i>Lepidosaphes beckii</i> )	Citrus, Eleagnus, Fig, Oak, Olive, and other plants.
Putnam Scale ( <i>Aspidiotus ancyllus</i> )	Apple, Ash, Beech, Cherry, Currant, Hackberry, Linden, Maple, Oak, Osage Orange, Peach, Pear, Pecan, Plum, Quince, Snowball, Willow.

## Insect, Pest or Disease

Plants Likely to Become Infested  
or InfectedPyriform Scale (*Pulvinaria**pyriformis*) -----Cape Jessamine, English Ivy  
and other plants.Red-banded Thrips (*Helio-**thrips rubrocinctus*) -----Avocado, Guava, Mango.

Red and Black Citrus Weevil

*(Praepodes vittatus)* -----Citrus.Root Knot, (*Heterodera**radicicola*) -----Apple, Asparagus, Banana,  
Bean, Beet, Begonia, Cabbage,  
Cantaloupe, Careless Weed,  
Carrot, Catalpa, Cauliflower,  
Celery, Chrysanthemum, Cot-  
ton, Cucumber, Daisy, Egg-  
plant, Fig, Grapes (old world),  
Hibiscus, Honeysuckles, Irish  
Potato, Japanese Persimmon,  
Kale, Lettuce, Mulberry, Mus-  
tard, Okra, Peach, Peanut,  
Peas, Pecans, Peony, Pepper,  
Pokeweed, Privet, Quince,  
Radish, Rape, Rose, Salvia,  
Soy Bean, Squash, Sweet  
Potato, Sugar Cane, Tobacco,  
Violet, Watermelon, Weigelia,  
Wisteria and other plants.Rot of Citrus (*Diplodia na-**talensis*) -----Citrus.San Jose Scale (*Aspidiotus**perniciosus*) -----Acacia, Alder, American Lin-  
den, Apple, Apricot, Ash,  
Black Walnut, Citrus trifolia-  
ta, Crab apple, Dogwood, Elm,  
English Willow, Euonymus,  
Gooseberry, Huckleberry,  
Japan Walnut, Laurel, Lemon,  
Lime, Lombardy Poplar,



Insect, Pest or Disease	Plant Likely to Become Infected or Infected
	Maple, Orange, Osage Orange, Peach, Pear, Pecan, Persimmon, Poplar, Plum, Quince, Raspberry, Rose, Snowball, Spiraea, Spruce, Strawberry, Sumac, Willow and other plants.
Scab ( <i>Actinomyces chromogenus</i> ) -----	Irish Potato.
Scaly Bark ( <i>Cladosporium herbarum</i> var. <i>citricolum</i> )	Citrus.
Six-spotted Mite ( <i>Tetranychus sexmaculatus</i> ) -----	Citrus.
Snow Scale ( <i>Chionaspis citri</i> ) -----	Citrus, Euonymus, Palms, and other plants.
Soft Brown Scale ( <i>Coccus hesperidum</i> ) -----	Box, Camellia, Citrus, Holly, Ivy, Jessamine, Laurel, Mimosa, Myrtle, Oleander, Phlox, and other plants.
Stem-end Rot ( <i>Phomopsis citri</i> ) -----	Citrus.
Stem Rot of Sweet Potato ( <i>Fusarium</i> sp.) -----	Sweet Potato and Egg Plant.
Strawberry Crown Borer ( <i>Tyloclerma fragariae</i> ) ----	Strawberry.
Strawberry Crown Girdler ( <i>Otiorynchus ovalis</i> ) ----	Strawberry.
Strawberry Root Louse ( <i>Aphis forbesi</i> ) -----	Strawberry.
Striped Citrus Weevil ( <i>Diaprepes abbreviatus</i> var. <i>spenglerii</i> ) -----	Citrus.
Sugar Cane Mealybug ( <i>Pseudococcus calceolariae</i> )	Sugar Cane, Johnson Grass.

Insect, Pest or Disease	Plants Likely to be Infested or Infected
Sugar Cane Moth Borer ( <i>Diatraea saccharalis</i> <i>crambidoides</i> ) -----	Sugar Cane, Corn, Sorghum, and grasses.
Sweet Potato Mosaic -----	Sweet Potato.
Sweet Potato Weevil ( <i>Cylas</i> <i>formicarius</i> ) -----	Sweet Potato, Morning Glory, and Bindweed.
Walnut Scale ( <i>Aspidiotus</i> <i>juglans-regiae</i> ) -----	Apple, Apricot, Cherry, Japan Plum, Locust, Maple, Peach, Pear, Pecan, Walnut.
White-Winged White-Fly ( <i>Dialeurodes citri</i> ) -----	Blackberry, Ivy, Button Bush, Cape Jessamine, Cherry Laurel, Chinaberry, Citrus, Honeysuckle, Japonica, Olean- der, Osage Orange, Pomegran- ate, Smilax, Scrub Palmetto, Trumpet Flower, Water Oak, and other plants.
White - Fly ( <i>Trialeurodes</i> <i>floridensis</i> ) -----	Avocado, Guava.
White - Fly ( <i>Paraleurodes</i> <i>perseae</i> ) -----	Citrus, Avocado.
Withertip ( <i>Colletotrichum</i> <i>gloesporioides</i> ) -----	Citrus.
Woolly White-Fly ( <i>Aleuro-</i> <i>thrixus howardi</i> ) -----	Citrus.
Zizyphus Scale ( <i>Parlatoria</i> <i>zizyphus</i> ) -----	Citrus and other plants.

Rule 3—Inspectors employed by the Plant Board shall examine trees, plants and plant products in nurseries, orchards and other places within the State of Mississippi, in order to determine whether such trees, plants and plant products are infested or infected with any insect, pest or disease declared

to be or listed by the State Plant Board as being either a public nuisance or an especially injurious insect, pest, or disease, and shall report their findings to the Plant Board.

Rule 4—The planting, transplanting or otherwise moving of any plants which are infected with citrus canker, or which, in the opinion of an inspector of the Plant Board, are likely to carry canker infections, is prohibited.

Rule 5—All plants found to be infected with citrus canker shall be entirely destroyed by burning, and without being cut, or otherwise handled or moved. Further, the ground shall be thoroughly burned for a distance of three feet beyond the utmost spread of the branches of the infected plant.

Rule 6—Every grove, nursery or separate plant situated in the State of Mississippi which has been found to be infected with citrus canker is hereby declared to be the center of an infected and dangerous zone.

Rule 7—The planting or movement of citrus plants within a zone extending one-half mile in every direction from said center is hereby prohibited until such time as in the judgment of the Board such dangerous conditions may have ceased to exist; provided, that citrus trees or plants in such zone may be moved within a property located more than one-quarter of a mile from the center of such zone, when moved under the supervision of an agent of the Plant Board, and provided, further, that citrus trees from certified nurseries may be planted as re-sets in non-infected groves located within such zone when such replanting is done under the supervision of an agent of the Plant Board, and provided, further that citrus trees or plants located within such zone may be budded by and with the consent and approval of the Chief Inspector under such precautions and conditions as he may specify.

Rule 8—No certificate shall be issued for the movement of citrus nursery stock located within one-half mile of any center of infection as defined by Rule 6 until such time as

in the judgment of the Board the dangerous conditions in such center may have ceased to exist.

Rule 9—The movement of non-citrus trees and plants from within any canker-infected grove or nursery is prohibited until such time as in the judgment of the Board the dangerous conditions in such property may have ceased to exist.

Rule 10—The planting or movement of citrus trees or plants within any canker-infected property or center as defined by Rule 6 is hereby prohibited until the Board shall have declared such property to be no longer a dangerous center, and thereafter until the soil in such infected property shall have been disinfected in such manner, to such an extent and under such conditions as may be prescribed by the Chief Inspector.

Rule 11—No certificate shall be issued for the movement of nursery stock from a nursery in which vehicles, teams, laborers or other persons, nursery implements or other things enter, that likewise enter or are used in any nursery or grove infected with citrus canker.

Rule 12—The planting, cultivating or harvesting of any truck or field crop in a grove or nursery which is, has been, or shall become infected with citrus canker, is hereby prohibited until such times as the Chief Inspector may deem such procedure unlikely to spread citrus canker.

Rule 13—Hereafter work in properties infected with citrus canker shall be carried on by the owner or his employees, under the general supervision of agents of the Plant Board. Said agents shall have authority such that in case the work in infected properties is being carried on in such manner as to make likely the spread or dissemination of citrus canker, whether within the affected property or other properties, they may so restrict the manner of carrying on such work as to prevent as far as possible the spread of the disease.

Rule 14—The harvesting of citrus fruits from any grove which is, has been or shall become infected with citrus

canker is hereby prohibited except when such harvesting shall be carried on under the immediate supervision of an agent of the Plant Board. Said agent of the Board shall be authorized to prescribe such precautions in connection with the harvesting of such fruit and the hauling or otherwise moving thereof as shall, as far as possible, render unlikely the further dissemination of citrus canker.

The packing of citrus fruit from such an infected property shall be carried on only under the immediate supervision of an agent of the Board. Said agent shall be authorized to prescribe such precautions in connection with the packing and otherwise handling of such fruit for shipment as shall, as far as possible, render unlikely the further dissemination of citrus canker.

The shipment of citrus fruit consigned to any point in the State of Mississippi from such an infected grove or from any packing house in which the fruit from such an infected grove has been prepared for shipment is hereby prohibited.

The shipment of citrus fruit in bulk or otherwise than wrapped and packed in standard crates from such infected property or from any packing house in which fruit from an infected property is prepared for shipment is hereby prohibited, and the acceptance thereof for transportation by a common carrier is likewise prohibited.

Provided, that this rule shall not apply to such properties as have been declared by the Board as no longer infected with citrus canker.

Rule 15—The pasturing, or allowing to run at large, of live stock, poultry and hogs included, in any grove or other property which is, has been or shall become infected with citrus canker is hereby prohibited until such time as the Board may deem such procedure unlikely to spread citrus canker.

Rule 16—On account of the danger of further spreading citrus canker the practice of using leaves, twigs or branches

of citrus trees and the products obtained therefrom for the purpose of disseminating the fungi used for the control of the white fly and citrus scale insects is hereby restricted to the use of such material as may be obtained from trees located outside the limits of any area declared by the Board to be dangerous on account of the prevalence of citrus canker therein and the picking, shipping or using of leaves, twigs or branches taken from trees located within such dangerous area is hereby prohibited.

Rule 17—The owners, officers and employees of any nursery which may be found at any time to be infested or infected with an especially injurious insect, pest, or disease, or which has heretofore been so infested, or infected, shall, on demand of the Entomologist, furnish a list of all shipments and sales of nursery stock from said nursery from any date set by the Entomologist up to and including the date of such demand. Said list shall show the names and addresses of all purchasers, the names and addresses of all consignees and a complete description of the stock included in each and every shipment.

Rule 18—Every grove, field, nursery or other property in which has been found any disease or insect pest which has been declared a public nuisance by the State Plant Board under the provisions of the Plant Act of 1918 (as amended in 1920), shall be conspicuously posted with signs warning all parties against trespassing, said signs to read as follows: "No Trespassing. By Order of the State Plant Board." The words "NO TRESPASSING" to be in letters no less than four inches in height and the words "State Plant Board" to be in letters not less than two and one half-inches in height, such letters to be of prominent bold-faced type, easily read. The mutilation, defacing, removing or destroying of such signs by any parties whomsoever is hereby prohibited. Provided, that the posting of such notices shall not be required in the case of any property which has been declared by the State Plant Board to be no longer a danger center.

Rule 19—Repealed-Superseded by Rule 43.

Rule 20—Any person affected by any rule or regulation made or notice given pursuant to the Mississippi Plant Act of 1918 (as amended in 1920), may have a review thereof, for the purpose of having such rule, regulation or notice modified, suspended or withdrawn, by filing a written request with the Chairman of the State Plant Board, stating the particular rule, regulation or notice regarding which action is desired and setting forth the objections to the enforcement of said rule, regulation or notice.

At the time of filing said written request the person asking for such review shall deposit certified check for one hundred dollars (\$100) with the Chairman of the Board, or, in case the destruction of property is involved, with the agent of the Board responsible for the carrying out of the provisions of the Mississippi Plant Act of 1918 (as amended in 1920), in the locality in which the property is located. Said sum of \$100 is to be applied towards defraying the expenses of a special meeting of the Board, providing the Chairman considers the exigencies of the case require action before the next regular meeting.

In case such special meeting is called the Secretary of the Board shall present an account of the expenses incurred for holding said meeting and if these expenses are less than \$100 the balance shall be returned to the person requesting the review.

On such review all facts and representations offered on behalf of the applicant or on behalf of the Board may be presented to the Board in the form of affidavits.

The operation or enforcement of any rule or regulation made or notice given by the Board is not to be held in abeyance pending a review thereof but is to remain in full force and effect until modified, suspended or withdrawn by action of the Board. Providing that where the enforcement of a rule requires the destruction of the property of the party making the appeal to the Board in the manner aforesaid and the said sum of \$100 to cover costs having been deposited with an agent of the Board, such destruction shall be sus-

pended until the party shall have had the opportunity of being heard on his appeal; provided, that the party thus appealing complies with the instructions of the agent of the Board to the end that no especially injurious insect, pest, or disease shall be disseminated.

Rule 21—Any and all plants or plant products subject to the provisions of the Mississippi Plant Act of 1918 (as amended in 1920) whether in transit or in the hands of the possessor, may be held for inspection regardless of whether they are certified or not, and if such plants or plant products are found to have been moved or transported in violation of the rules or regulations of the Plant Board, or if found infested or infected with any injurious insect, pest, or disease, such plants or plant products must be deported, sprayed or otherwise treated upon the order of the Entomologist, if in his opinion this is necessary for the protection of the agricultural or horticultural interests of the State.

Rule 22 A—Any article or any box, bundle, parcel or other container which has been intercepted, while in transit, by an agent of the State Plant Board and is being held subject to examination or determination as to final disposition shall have attached to it a tag clearly indicating to employees of the transportation companies and the public, that the article or container to which the tag is attached is being held subject to the rules and regulations of the Board. This tag shall be known as the "Hold Out Tag," and shall be in substantially the following form:



UNDER QUARANTINE

**HOLD OUT  
FOR INSPECTION**

Do not remove this package from this station until this tag has been removed, and the contents of package inspected and certified by the Inspector of the STATE PLANT BOARD OF MISSISSIPPI.

(over)

UNDER QUARANTINE

**WARNING**

This package and its contents are being held in quarantine. All persons are hereby warned not to open, destroy, or remove the same under penalty of prosecution.

By order of

R. W. Harned, Entomologist

\_\_\_\_\_  
Inspector.

(over)

The use of this tag or the removal of same from any article or container, to which it is attached, by any person other than an authorized agent of the Plant Board is forbidden.

Rule 22 B—The movement or shipment of, or tampering with, any article or any box, bundle, parcel or other container having attached thereto a Hold Out Tag, which tag has been attached by an agent of the State Plant Board, is prohibited until such article or the contents of such box, bundle, parcel or other container shall have been inspected, the Hold-Out Tag removed therefrom and the article or container officially released by an agent of the Board.

Rule 22 C—Whenever an authorized Inspector of the State Plant Board shall find in the possession of any common carrier in this State any shipment, article or product that is infected or infested with any insect, pest, or disease, the dissemination of which under the law or rules of this Board, now or hereafter promulgated, is or shall be prohibited, such common carrier shall make no further transportation or delivery of such shipment, article or product so infected or infested, otherwise than to return the same to the shipper to be by him dealt with or treated as the law may provide. At the time of such inspection such inspector shall deliver to such common carrier a certificate in substantially the following form:

"To\_\_\_\_\_and All Whom It May Concern:  
(Name of Carrier)

"This is to certify that on the\_\_\_\_\_day of\_\_\_\_\_  
19\_\_\_\_, the undersigned inspected while in your possession at  
\_\_\_\_\_, Miss., a shipment of\_\_\_\_\_  
(Kind and Nature)  
consisting of\_\_\_\_\_bundles or packages, shipped by  
\_\_\_\_\_ of \_\_\_\_\_  
State\_\_\_\_\_ to\_\_\_\_\_ at  
\_\_\_\_\_, State of Miss., and found the same to  
be infected or infested with\_\_\_\_\_  
(Name of insect, pest or disease)

"And you are hereby notified that the transportation and delivery of said shipment so infected or infested, within the State of Mississippi, is prohibited by law and the Rules of the State Plant Board thereunder, except for the purpose of returning said shipment to the shipper, to be by him dealt with or treated as the law may require.

"This\_\_\_\_\_day of\_\_\_\_\_, 19\_\_\_

State Plant Board Inspector."

It shall also be the duty of said Inspector to forthwith notify the consignee and consignor, if their names and addresses be known to such Inspector, which notice shall contain in substance the information provided for in the foregoing form of certificate.

Rule 23—Repealed—Superseded by Rules 45 and 54.

## PUBLIC NOTICE

### Declaring Certain Areas To Be Infested With The Sweet Potato Weevil.

In accordance with Section 14 of the Mississippi Plant Act of 1918, (as amended in 1920), Chapter 219 of the laws of 1918, the State Plant Board of Mississippi does declare and give public notice thereof that the sweet potato root weevil (*Cylas formicarius*) is an insect pest, the dissemination of which should be prevented, that sweet potato plants, vines, slips, cuttings, draws, and tubers, and morning glory (*Ipomoea sp.*) vines and roots are plants likely to become infested by said insect pest and that the following areas are within the State of Mississippi in which said insect pest is known to occur; the counties of Hancock, Harrison, and Jackson, and all of that portion of Pearl River County lying south of a line running east and west through Derby.

Rule 24—Superseding Rules 24 A and 24 B.

#### Section I.

(a). The following regulations governing the growing, harvesting, storing, movement or shipment of sweet pota-

toes, sweet potato plants, vines, cuttings, or parts thereof, shall be effective from and after January 1, 1925, and shall apply to all properties and areas that have been or may be designated in Public Notices of the State Plant Board as being infested with the sweet potato weevil, (*Cylas formicarius*.)

(b.) There shall be no movement or shipment of sweet potato plants, vines, cuttings or parts thereof from the infested area into or through any other part of the State of Mississippi.

(c.) There shall be no movement or shipment of sweet potatoes from the infested area into any other part of the State of Mississippi.

(d.) There shall be no movement or shipment of sweet potatoes from the infested area through any other part of the State of Mississippi except upon special permit issued by the Chief Inspector.

## Section II.

(a.) The discovery of the sweet potato weevil on a property within the State of Mississippi by an authorized agent of the Mississippi State Plant Board or the United States Bureau of Entomology shall be immediately reported to the Chief Inspector of the State Plant Board of Mississippi, and the following regulations shall apply on such infested property until such time as the property has been found to be entirely free of sweet potato weevils for a period of two years. The term "infested property," as used herein, shall be construed to mean any property on which any stage of the sweet potato weevil has been found by an authorized agent of the State Plant Board of Mississippi or the United States Bureau of Entomology.

(b.) The location for the sweet potato field on an infested property shall be approved by the authorized agent in charge before any sweet potato plants, vines, or cuttings are planted; provided, that no sweet potato plants, vines, or cuttings shall be set out on an infested property in soil that was planted to sweet potatoes the previous year.

(c). The location and condition of sweet potato storage places on infested properties shall be approved by the authorized agent in charge at least two weeks before the sweet potato crop is harvested.

(d). All sweet potatoes grown on an infested property shall be harvested on or before December 15 of each year, and owners of infested properties shall thoroughly clean fields at the time of harvest, removing all sweet potatoes and parts thereof.

(e). Before harvesting sweet potatoes on infested properties, owners of the same shall cut off and remove all sweet potato vines from the fields. The authorized agent in charge shall supervise the removal of such vines and will see that they are disposed of in such a manner as to remove all danger of their being a source of food for any stage of the sweet potato weevil.

(f). No sweet potato plants, vines, or cuttings shall be moved from an infested property.

(g). No sweet potatoes shall be moved from an infested property except upon special permit obtained from an authorized agent of the State Plant Board of Mississippi or the United States Bureau of Entomology, this permit to be in the form of a certificate tag issued by the Chief Inspector of the State Plant Board and countersigned by the agent supervising the movement; provided that no sweet potatoes moved from an infested property shall be used for planting purposes. One certificate tag must be attached to every package or other container of sweet potatoes moved from an infested property, and the use of certificate tags will be reported immediately to the Chief Inspector in such manner as he may prescribe.

### Section III.

(a). That part of Pearl River County lying south of a line running due East and West through the town of Derby is hereby declared a Special Eradication Area, subject to the following rules and regulations in addition to those hereinbefore enumerated in Sections I and II.

(b). No sweet potatoes shall be bedded on an infested property.

(c). Owners of infested properties shall have the option of using sweet potato plants furnished without charge by the State Plant Board of Mississippi, or may purchase plants at their own expense from sources approved by the State Plant Board.

(d). No sweet potato plants, vines, cuttings, or parts thereof shall be planted on an infested property until the authorized agent in charge has certified to the Chief Inspector that said property has been entirely free of sweet potatoes, sweet potato plants, vines, or cuttings for a period of four weeks.

#### Section IV.

(a). The Counties of Jackson, Harrison and Hancock are hereby declared a General Control and Eradication Area, subject to the following rules and regulations in addition to those hereinbefore enumerated in Sections I and II.

(b). Owners of infested properties shall have the option of producing their sweet potato plants as specified in paragraphs (c), (d), and (e) of this section, or may purchase them at their own expense from sources approved by the State Plant Board; provided, that no sweet potato plants, vines, or cuttings purchased from sources approved by the State Plant Board shall be planted on an infested property until the authorized agent in charge has declared such property entirely free of sweet potatoes, sweet potato plants, vines, or cuttings for a period of four weeks.

(c). The location of sweet potato plant beds on infested properties must be approved by the authorized agent in charge.

(d). No sweet potatoes shall be bedded on an infested property except under the supervision of the authorized agent in charge, who shall also assist the owner in hand culling and fumigating all seed potatoes not more than one week before bedding; provided, that no sweet potatoes shall

be bedded on an infested property until the agent in charge has found such property entirely free of all sweet potatoes, plants, vines, or cuttings, except those potatoes retained for seed purposes.

(e). The seed potatoes and plants in plant beds on an infested property must be removed from the beds and destroyed under the supervision of the authorized agent in charge as soon as sufficient plants have been produced for said property, provided, that all plant beds on such properties must be destroyed before the first day of July of each year, and further provided, that if such plant beds are found to be infested with the sweet potato weevil, they shall be immediately destroyed.

Rule 25—The movement of any and all host plants of cottony cushion-scale from a property on which cottony cushion-scale is known to have been present or from a property in a locality in which cottony cushion-scale is known to have been generally distributed, is hereby prohibited, until after such plant or plants have been treated by being completely immersed in a solution containing one pound of fish oil soap, or other approved soap, to three gallons of water and all accessible parts thereof have been scrubbed with this solution under the personal supervision and direction of a duly authorized agent or inspector of the State Plant Board whose services shall be paid for in advance by the owner of such nursery stock or other host plants of the cottony cushion-scale.

Rule 26—Repealed—Superseded by Rule 46.

Rule 27—The movement of all trees and plants commonly known as nursery stock, including budwood and scions, which do not have attached thereto a proper certificate tag, issued by the State Plant Board, and which have not been prepared for movement in accordance with the Rules and Regulations of the State Plant Board, in other respects, is hereby prohibited.

Rule 28—No certificate shall be issued for the movement of any nursery stock until such stock shall have been

inspected by an Agent of the State Plant Board, and found to be apparently free from especially injurious insects, pests, or diseases. Should any especially injurious insect, pest, or disease be found, either on the nursery stock or on the premises, no certificate shall be issued until such insect, pest, or disease has been suppressed to the satisfaction of the Nursery Inspector. No certificate shall be issued when the nursery stock is exposed to infestation or infection from any especially injurious insect, pest, or disease that occurs within one-fourth mile from where any part of said nursery stock is located; provided, however, that the nurseryman may remove such stock under the direction of the Nursery Inspector, and under such precautions as he may specify, and provided, further, that nothing in this rule shall be construed as preventing the enforcement of quarantines to a greater distance than one-fourth mile in the case of properties declared by the Board to be infested or infected with any insect, pest, or disease declared to be a public nuisance.

Rule 29—All shipments of nursery stock and every package thereof, transported within, into, or out of the State of Mississippi, shall be completely and securely boxed or covered to prevent infestation or infection by injurious insects, pests, or diseases. Carload shipments in bulk shall be in cars with openings effectually screened or closed.

Rule 30—All nursery stock, except those plants that will not stand defoliation, shall be completely defoliated, including leaf-stalks. Citrus must always be defoliated. All nursery stock shall be handled in such a manner that none of the leaves or clippings shall become mixed with any packing material.

Rule 31—All pecan, apple, pear, plum, and peach stock and all other host plants of San Jose scale which will stand fumigation, shall be fumigated with hydrocyanic acid gas immediately before being delivered for transportation. Every nurseryman shall have his fumigation box or house completed and in order, with necessary chemicals at hand, ready to demonstrate his ability to fumigate nursery stock



at the time of inspection. No certificate shall be issued until the fumigating facilities have been approved by the Nursery Inspector. Provided, that dipping nursery stock in a suitable solution may be substituted for fumigation in emergency cases, if approved by a representative of the State Plant Board.

Rule 32—Any certificate may be revoked and all certificate tags recalled, at any time, for any violation of the provisions of the Mississippi Plant Act of 1918, (as amended in 1920), or the Rules and Regulations of the State Plant Board, or of the requirements of the Nursery Inspection Department.

Rule 33—Mississippi grown forest trees, shrubs, vegetable plants when apparently free from insects and plant diseases need not be inspected, but may be sold, exchanged, or transported without a certificate tag attached. This does not include strawberry and sweet potato plants. These must be inspected and certified.

Rule 34-A—The Nursery Inspector shall be required to have prepared and shall arrange that any person entitled thereto may obtain, under such conditions as the Nursery Inspector may name, certificates in proper form and serially numbered, to be affixed to any nursery stock the movement of which is permissible under the provisions of the Mississippi Plant Act of 1918 (as amended in 1920).

The Nursery Inspector shall be further required to keep in his office exact records covering the issuance of all such certificates and the movement of nursery stock for which such certificates have been used, and the persons by whom such certificates have been obtained shall be required to provide the Nursery Inspector at any time and in such manner as he may designate, with the information necessary for the keeping of such records.

The Nursery Inspector shall have the authority to call for the return of any unused certificates at his discretion.

The cost of printing such certificates shall be paid by the nurserymen to whom furnished.

The forms of certificates to be issued to cover the movement of nursery stock shall be as follows:

Serial Number

Form No. 1

Issued \_\_\_\_\_ 19 \_\_\_\_\_

**MISSISSIPPI STATE PLANT BOARD**

**Office of Nursery Inspector**

**A. & M. College, Miss.**

**Nursery Certificate**

The undersigned hereby certifies that the \_\_\_\_\_ nursery stock, in the nurseries of \_\_\_\_\_ located at \_\_\_\_\_, Mississippi, has been thoroughly inspected. The stock, premises, and adjacent properties have been found to be apparently free from especially injurious insects, pests, and diseases. The owner has agreed to completely defoliate (when possible) and to fumigate properly with hydrocyanic-acid gas, or to otherwise treat as directed, all stock sold or moved under this certificate, as provided in the Rules and Regulations.

A complete list of plants transported under this tag with the name and address of the consignee is on file in the office of the Nursery Inspector, A. & M. College, Mississippi.

The use of this certificate tag upon nursery stock which has not been inspected by a duly appointed nursery inspector of the Plant Board is a violation of the law and will be prosecuted.

Approved:

Entomologist

Nursery Inspector

Serial Number.

Form No. 2

Issued \_\_\_\_\_ 19 \_\_\_\_\_

**MISSISSIPPI STATE PLANT BOARD**

**Office of Nursery Inspector**

**A. & M. College, Miss.**

**Nursery Dealer's Certificate**

The undersigned hereby certifies that the nursery stock sold by \_\_\_\_\_ of \_\_\_\_\_, Mississippi,

is apparently free from injurious insects, pests, and diseases, and that the same may be transported under the provisions of the Mississippi Plant Act.

The undersigned further declares that \_\_\_\_\_ has furnished him with names and addresses of the persons from whom and the localities where he purchased or obtained the nursery stock sold under this certificate.

A complete list of the plants transported under this tag with the name and address of the consignee is on file in the office of the Nursery Inspector at A. & M. College, Mississippi.

Approved:

Entomologist

Nursery Inspector.

Form No. 3

(Serial Number) Q

# STATE PLANT BOARD OF MISSISSIPPI

Office of

Quarantine Inspector, A. & M. College, Miss.

\_\_\_\_\_, Miss., \_\_\_\_\_ 192\_\_

This is to certify that the undersigned has this day inspected the contents of this package from \_\_\_\_\_ consigned to \_\_\_\_\_ and has found them apparently free from especially injurious insects, pests, and diseases. No plants or plant products were found therein, the importation of which is prohibited by the Rules of the State Plant Board of Mississippi, under the Mississippi Plant Act of 1918, (as amended in 1920).

All persons are warned, under penalty of the law, not to use this certificate tag upon any shipments, or upon any plant products other than those described and inspected as above.

Authorized:

\_\_\_\_\_  
Entomologist.

\_\_\_\_\_  
Quarantine Inspector.

\_\_\_\_\_  
Inspector.

Rule 34-B—Agents or salesmen representing nursery firms shall register with and obtain an agent's or salesman's certificate from the Nursery Inspector, A. & M. College, Mississippi, before selling, delivering, or taking orders for nursery stock in Mississippi. Applications by agents or salesmen for registration and a certificate shall be submitted to the Nursery Inspector, A. & M. College, Mississippi, on form letters furnished by the Nursery Inspection Department. The information asked for on this letter shall be given and attested to by affidavit by each agent or salesman before obtaining a certificate. Two photographs of the applicant which meet with the approval of the Nursery Inspector shall be submitted with each application for certificate.

Rule 35—Any person or firm desiring to ship nursery stock into Mississippi shall file with the Nursery Inspector a satisfactory certificate of inspection. They will then be privileged to purchase Permit Certificate tags from the Mississippi Nursery Inspector. One, and only one, Permit Certificate tag shall be attached to each bundle or other container of nursery stock shipped into Mississippi. Shipments shall be prepared and tags accounted for in accordance with requirements of the Nursery Inspection Department of the State Plant Board of Mississippi. The permit shall be of the form shown below:

(Serial Number)

**MISSISSIPPI STATE PLANT BOARD**

**Office of Nursery Inspector**

**A. & M. College, Miss.**

Season\_\_\_\_\_

**Permit Certificate**

Citrus stock will not be permitted under this certificate.

This is to certify that there has been filed with the State Plant Board of Mississippi the certificate of the proper inspection official of the State of\_\_\_\_\_ stating

that the stock grown by \_\_\_\_\_ of \_\_\_\_\_  
has been duly inspected for the season of \_\_\_\_\_  
and found to conform with the requirements of the State  
Plant Board.

This certificate expires on September 30, \_\_\_\_\_.

A complete list of the plants transported under this tag  
with the name and address of the consignee is on file in the  
office of the Nursery Inspector, A. & M. College, Mississippi.

Entomologist.

Nursery Inspector

Rule 36—Persons or firms desiring certification of nursery stock shall file a request for inspection with the Nursery Inspector, at A. & M. College, at least sixty days in advance of the date upon which they desire to move or sell such nursery stock. Persons or firms requesting certification on shorter notice may be charged with the fee covering the expenses of inspection and certification as provided for in Section 11 of the Mississippi Plant Act of 1918 (as amended in 1920).

Rule 37 A—The importation into the State of Mississippi of any and all of the following plants, plant products and stone and quarry products, originating in that portion of the New England States defined by the United States Department of Agriculture as being territory infested with the gypsy moth (*Porthetria dispar*), is hereby prohibited, except that shipments of the things or articles herein enumerated may be admitted and permitted delivery in this State when accompanied by an inspection certificate (or permit) issued by a properly authorized agent of the United States Department of Agriculture or by the proper inspection official of the State in which such shipments originate, showing that they have been inspected, and found free from the gypsy moth and the larvae, pupae and eggs thereof, and plainly labelled with the names and addresses of both consignor and consignee.

All trees, plants, shrubs, vines, cuttings, grafts, buds,

and all other trees and plants, or parts thereof, commonly known as nursery stock.

All forest, fruit and ornamental trees and shrubs and parts thereof.

Field-grown florists stock, shrubs, vines, and all other plants or parts thereof for planting or propagation, except flower or vegetable seeds.

Forest-plant products, including logs, tan bark, posts, poles, railroad ties, cordwood, lumber, box-bands, and hoops.

Coniferous trees, such as spruce, fir, hemlock, pine, juniper, cedar, and arbor vitae, known and described as Christmas trees, and parts thereof.

Decorative plants, such as holly and laurel, known and described as Christmas greens or greenery.

Stone and all other quarry products.

Shipments of any of the articles aforesaid, originating at any point within the area defined by the United States Department of Agriculture as being infested by the gypsy moth, arriving at any port or other destination in the State of Mississippi without being accompanied by the certificate of inspection herein required, shall be subject to immediate deportation upon the order of the Entomologist or his assistants, or otherwise treated as the Entomologist may direct.

Rule 37 B—The importation into the State of Mississippi of any and all of the following plants originating in that portion of the New England States defined by the United States Department of Agriculture as being territory infested with the brown-tail moth (*Euproctis chrysorrhoea*), is hereby prohibited, except that shipments of the plants and parts of plants herein enumerated may be admitted and permitted delivery in this State when accompanied by an inspection certificate (or permit) issued by a properly authorized agent of the United States Department of Agriculture or by the proper inspection official of the state in which such shipments originate, showing that they have been in

spected, and found free from the brown-tail moth and all stages thereof, and plainly labeled with the names and addresses of both consignor and consignee:

All trees, plants, shrubs, vines, cuttings, grafts, buds, and all other trees and plants, or parts thereof, commonly known as nursery stock.

All forest, fruit, and ornamental trees and shrubs and parts thereof.

Field-grown florist stock, shrubs, vines, and all other plants or parts thereof for planting or propagation, except flower or vegetable seeds.

Shipments of any of the plants or parts of plants aforesaid, originating at any point within the area defined by the United States Department of Agriculture as being infested by the brown-tail moth, arriving at any port or other destination in the State of Mississippi without being accompanied by the certificate of inspection herein required, shall be subject to immediate deportation upon the order of the Entomologist or his assistants, or otherwise treated as the Entomologist may direct.

Rule 38—The introduction into the State of Mississippi through the ports thereof of plants, fruits, vegetables or other material that is likely to introduce insects, pests or diseases especially injurious to the agricultural and horticultural interests of the State is hereby prohibited; provided, however that plants, parts of plants, fruits or vegetables, the importation of which into the State has not been specifically prohibited, and which shall be found upon inspection by a properly appointed agent of the Plant Board to be apparently free from such especially injurious insect pests and diseases shall be permitted to enter the State and be transported, sold, or exchanged within the State.

Rule 39—The importation of citrus fruits, sapodillas (*Achras sapotes*), guavas, mangoes, peaches, and plums into the State of Mississippi from Mexico, in which country the Morelos fruit worm or orange maggot (*Anastrepha*

(*Trypeta ludens*), is known to occur, is hereby prohibited and such importations arriving at any port, railway station or other place in the State of Mississippi, or found in the waters adjacent thereto, shall be subject to immediate confiscation by agents of the Plant Board.

Rule 40—The importation into the State of Mississippi of any and all fruits, vegetables, plants or parts of plants listed by the Federal Horticultural Board as hosts of the Mediterranean fruit fly (*Ceratitis capitata*) from Africa (Cape Colony, Congo, Delagoa, Dahomey, Nigeria, Transvaal, and Uganda), Argentine Republic, Australia, Azores, Bermuda, Brazil, Cape Verde Islands, Europe (Italy, France, Malta, Spain, and Sicily), Hawaiian Islands, Madeira, and New Zealand, wherein the Mediterranean fruit fly is known to exist, is hereby prohibited and such importations arriving at any station, port or other place within the State of Mississippi, or found in the waters adjacent thereto, shall be subject to immediate confiscation by agents of the Plant Board, excepting that the following plant products may be admitted in the form herewith specified from the countries above listed as being those in which the Mediterranean fruit fly is known to exist:

Coffee bean, Figs (dried), Lemons.

Rule 41—It shall be the duty of any common carrier, operating within the State of Mississippi, its agents or employees, to notify the Entomologist, or his duly authorized agent, immediately upon the receipt by such common carrier of any shipment of any article or thing coming under the provisions of the Plant Act of 1918 (as amended in 1920) and offered to such common carrier for transportation and delivery, as to which the requirements of the Plant Act of 1918 (as amended in 1920) or any of the rules and regulations of the State Plant Board have not been complied with; and such common carrier shall not transport or deliver such illegal shipments but shall hold same safe pending instructions from the Entomologist or his duly authorized representative as to the disposition to be made of such illegal shipment.



Rule 42—In order to prevent the introduction into Mississippi of the very destructive insect enemy of alfalfa known as the Alfalfa Weevil (*Phytonomus posticus*) the shipment into this state of articles listed below that originated in the states of California, Colorado, Idaho, Nevada, Oregon, Utah, and Wyoming is hereby prohibited:

(a) Alfalfa hay and all other kinds of hays, straws, excelsior, leaves, etc.

(b) Fresh fruits and vegetables except when accompanied by an inspection certificate of a recognized State Pest Inspection Officer of the state where the shipment originated. The inspectors certify that shipments were repacked from orchard or field into new clean boxes or other fresh containers; that all wagons or other conveyances used in hauling to the place where repacking was conducted were free of alfalfa hay and other hays, straw and other means of contamination; that all packing houses were at all times free of alfalfa hay and other hays, straw, and all means of contamination.

(c) All nursery stock, unless accompanied by special certificate setting forth that such nursery stock has been fumigated for the alfalfa weevil in an airtight enclosure subsequent to being boxed, baled or packed for shipment, with cyanide of potassium or cyanide of sodium at the rate of one ounce to each one hundred cubic feet of enclosed space.

(d) All railway shipments of livestock unless shipped in cars that are free from alfalfa hay and all other hays and straws when they leave the infested states. These articles may be added in states that are free of the alfalfa weevil.

(e) That no shipment of household or emigrant's movables originating in any state designated as infested with the alfalfa weevil shall be brought into the State of Mississippi by any common carrier, person or persons, unless such shipments be accompanied by a copy of a sworn statement made in duplicate by the owner or shipper to the effect that no nursery stock, vegetables, or fruit is included in the shipment and that no hay is included for packing material or any

other purpose, and the affidavit shall include a statement as to the articles contained in the shipment. One copy of this affidavit shall accompany the bill of lading and the other copy shall be mailed to the State Plant Board, A. & M. College, Mississippi.

Rule 43 A—In order to prevent the introduction into the State of Mississippi of citrus canker the importation of citrus nursery stock from the states of Texas and Louisiana is hereby prohibited. Provided, that special permits may be issued for the shipment of citrus trifoliata seed from Texas after a careful investigation by the Board has indicated that it is safe to do so.

B. Nurseries in states other than Texas and Louisiana may be issued special citrus permit tags under the following conditions:

1. That citrus canker has not been found within one mile of the nursery during the previous five years.

2. That citrus canker has not been found within fifteen miles of the nursery during the previous three years.

3. The nursery must have been carefully inspected by official nursery inspectors at least three times during the previous twelve months at intervals of at least thirty days between each inspection.

4. The nursery obtaining special citrus tags must comply with all other rules and regulations governing the shipment of nursery stock into Mississippi and promptly return any tags in their possession if requested to do so by the Nursery Inspector.

Rule 44—Repealed—Superseded by Rule 24.

Rule 45—In order to prevent the further distribution of the destructive insect enemy of sweet potatoes known as the sweet potato weevil, (*Cylas formicarius* Fab.) the importation into Mississippi of all sweet potatoes, sweet potato plants, vines, cuttings, draws, and slips, all morning glory plants

and parts of plants, from the following areas which are known to be infested with the sweet potato weevil, or are areas that are considered dangerous by the State Plant Board of Mississippi is hereby prohibited:

All foreign countries;

Alabama—Mobile and Baldwin Counties;

Florida—Baker, Brevard, Broward, Charlotte, Collier, Dade, DeSoto, Hardee, Hendry, Hillsborough, Lake, Lee, Manatee, Monroe, Okeechobee, Orange, Palm Beach, Pinellas, Saint Lucie, Sarasota, and Volusia Counties;

Georgia—Charlton County;

Louisiana—Entire State;

Oklahoma—Entire State;

Texas—Entire State;

All other areas in the United States that may hereafter become infested.

Rule 46 A—In order to prevent the introduction into the State of Mississippi of the Pink Bollworm (*Pectinophora gossypiella*, Saunders), the importation of cotton lint, linters, waste, sweepings and samples into Mississippi is prohibited from all foreign countries and from the Infested and Regulated areas of Louisiana, Texas, and New Mexico as described by the Federal Horticultural Board in Quarantine No. 52, (second revision) or any future quarantines which shall be issued by the Federal Horticultural Board. (This rule agrees with the Federal Quarantine so far as lint cotton is concerned.)

Rule 46 B—The shipment into Mississippi of cotton seed, seed cotton and cotton seed hulls is prohibited with the following exceptions:

1. Cotton seed and seed cotton grown in states other than Texas, Louisiana, New Mexico and Oklahoma may be brought into Mississippi upon permits issued by the Chief Inspector of the State Plant Board of Mississippi.

2. Upon evidence satisfactory to the Chief Inspector of the State Plant Board that it is safe to do so, permits may

be granted by the Chief Inspector for the shipment of cotton seed, seed cotton, and cotton seed hulls into the State of Mississippi from the Parishes of East Carroll, West Carroll, Catahoula, Concordia, Franklin, Madison, Morehouse, Pointe Coupee, Richland, Tensas, and all Parishes of Louisiana east of the Mississippi River.

3. Permits may be issued for the shipment of cotton seed hulls into Mississippi upon evidence that the seed were grown in states other than Western Louisiana, New Mexico, Oklahoma, and Texas, and permits may be issued to cover shipments of hulls from Western Louisiana, New Mexico, Oklahoma and Texas upon evidence satisfactory to the Chief Inspector of the State Plant Board that the hulls have been treated in such manner as to remove all danger of any Pink Bollworms being present.

Rule 46 C.—Before accepting shipments of cotton seed, seed cotton and cotton seed hulls destined for points in Mississippi, Transportation Agents will see that a permit issued by the Chief Inspector of the State Plant Board of Mississippi is furnished by the shipper and the original permit must be attached to the way-bill, accompany the way-bill to destination, and be kept on file at that point by the Transportation Agent.

Rule 46 D—Repealed.

Rule 47—Special permits may be issued by the Chief Inspector of the State Plant Board for the entrance into Mississippi of any quarantined plants, seeds, or plant products that are needed for experimental purposes by the United States Department of Agriculture or by the Mississippi Experiment Station.

These special permits will be issued only after careful investigation by the Chief Inspector and only when he is assured that there is no danger in admitting the plants, seeds, or plant products in question.

Rule 48—Repealed.

## PUBLIC NOTICE.

### Declaring Certain Areas In Other States To Be Infested With the European Corn Borer.

Under the provisions of the Mississippi Plant Act of 1918, (as amended in 1920) the State Plant Board of Mississippi, in session at A. & M. College, Mississippi, this the 19th day of September, 1924, does declare and give public notice thereof that the European corn borer (*Pyrausta nubilalis*, Hubn.), a destructive enemy of corn and other crops, an insect pest which does not occur in the State of Mississippi, now exists in the following states, to-wit:

Massachusetts, Michigan, Maine, New Hampshire, New York, Ohio, Pennsylvania, Rhode Island, Vermont.

And the State Plant Board of Mississippi further finds that in order to safeguard plants and plant products of Mississippi the introduction of this insect pest should be prevented.

The Board specifies that the following plants and plant products originating in the areas now designated, or that may be hereafter designated by the Federal Horticultural Board as infested with the European corn borer, (*Pyrausta nubilalis*, Hubn.), as infested or likely to become infested with this insect pest, to-wit:

(1) Corn and broom corn (including all parts of the stalk), all sorghums, sudan grass, celery, green beans in the pod, beets with tops, rhubarb, oat and rye straw as such or when used as packing, cut flowers, or entire plants of chrysanthemums, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia, except the bulbs thereof, without stems, from infested areas in Massachusetts, New Hampshire, Maine and Rhode Island.

(2) Corn and broom corn (including all parts of the stalk), all sorghums, and sudan grass from infested areas in Vermont, New York, Pennsylvania, Ohio, and Michigan.

It is, therefore, ordered by the State Plant Board of Mississippi that the introduction into the State of Mississippi

of the plants and plant products above listed as infested or likely to become infested with this insect pest, from the areas now designated by the Federal Horticultural Board in the regulations supplemental to its notice of Quarantine No. 43, as infested areas and from all other areas that may be hereafter found to be infested is hereby prohibited. Provided: That nursery stock and greenhouse stock and the other articles enumerated above may be brought into the State of Mississippi from the above designated areas when found upon inspection to be free from infestation of European corn borer (*Pyrausta nubilalis* Hubn.) and shall have been prepared and shipped in accordance with the rules and regulations of the Federal Horticultural Board and shall have attached thereto a valid certificate of the Federal Horticultural Board to that effect, and shall in other respects conform to the rules and regulations of the State Plant Board of Mississippi applying to the shipment of nursery stock into the State.

Rule 49—In order to prevent the introduction into Mississippi of the very destructive pest known as the European corn borer (*Pyrausta nubilalis* Hubn.) the shipment into this state of plants and plant products from areas in the United States classed by the Federal Horticultural Board as being infested with this insect is hereby prohibited; except when such shipments are accompanied by a certificate of the Federal Horticultural Board and in addition thereto shall conform to all regulations of the State Plant Board of Mississippi applying to the shipment of nursery stock into this state. It is further provided that farm products from the areas in the United States infested by the European corn borer may move into Mississippi without restrictions from December 31 to June 1, each year.

Rule 50 A—In order to prevent the further dissemination of mosaic disease of sugar cane, the sugar cane moth borer, and other pests, the movement or shipment of sugar cane for planting purposes within the State of Mississippi is hereby prohibited, except when accompanied by a certificate issued by the State Plant Board.

Rule 50 B—The shipment of sugar cane into Mississippi from other states and foreign countries, for any and all purposes, unless such shipments are accompanied by special permits issued by the State Plant Board of Mississippi is hereby prohibited. Permits may be issued when the shipments are known to originate in areas not known to be infected or exposed to the mosaic disease of sugar cane, or infested with the sugar cane moth borer, (*Diatraea saccharalis crambidoides*), sugar cane mealybug (*Pseudococcus calceolariae*), or other pests.

Rule 51 A—The shipment or movement within Mississippi or into this state from other states and countries of honey bees, queen bees, and of used or second-hand beehives, honey combs, frames and other beekeeping fixtures is hereby prohibited, except when such shipments are accompanied by a special permit issued by the Entomologist of the State Plant Board of Mississippi.

These permits will be issued when the Entomologist has sufficient evidence to assure him that there is no danger of the shipments being infected with foulbrood or other serious disease. The permit tags will be numbered and the people to whom they are issued must account for each one. All unused permit tags must be returned to the State Plant Board.

Rule 51 B—A quarantine is hereby placed by the State Plant Board of Mississippi on all apiaries, beeyards and colonies of bees within this state, wherein American foulbrood, European foulbrood, or other contagious or infectious diseases of honey bees is known to exist and hereafter such quarantine shall become effective upon all apiaries, beeyards, or colonies of bees wherein American foulbrood, European foulbrood, or other contagious or infectious disease is discovered. The removal of any and all colonies of bees, queen bees, nuclei and combs from such diseased and quarantined apiaries is hereby prohibited until such time as the Entomologist or his duly authorized representative shall have determined and declared that the disease is apparently eradicated from such diseased or infected apiary. The move-

ment of beehives, frames, supers, extractors and other mechanical equipment from apiaries under quarantine as aforesaid is hereby prohibited except when such equipment is first disinfected in a manner prescribed and approved by the Entomologist.

Rule 51 C—The exposure by any person of hives, combs, brood or honey from colonies or apiaries which are or have been infected with American or European foulbrood or other contagious or infectious disease in such manner as to expose other bees to the danger of infection, is hereby prohibited and such exposure of hives, combs, brood or honey from infected colonies or apiaries shall be considered a violation of Chapter 209, Laws of Mississippi, House Bill 648, approved April 3, 1920.

Rule 51 D—The shipment of any extracted or strained honey from any apiary in which any contagious or infectious disease of honey bees is known to exist in any container made in part or in whole of wood is hereby prohibited.

## PUBLIC NOTICE

### Declaring Certain Areas In Other States To Be Infested With the Japanese Beetle.

Under the provisions of the Mississippi Plant Act of 1918 (as amended in 1920) the State Plant Board of Mississippi in session at A. & M. College, Mississippi, this the 19th day of September, 1924, does declare and give public notice thereof that the Japanese beetle (*Popillia japonica* Newm.), an insect pest which does not occur in the State of Mississippi, now exists in the following states, to-wit: Delaware, New Jersey, Pennsylvania.

And the State Plant Board of Mississippi further finds that in order to safeguard plants and plant products of Mississippi the introduction of this insect pest should be prevented.

The Board specifies the following plants and plant products originating in the areas described now or hereafter by



the Federal Horticultural Board as being infested with the Japanese beetle (*Popillia japonica* Newm.), as infested or likely to become infested with this insect, to-wit:

(1) **Farm products:** Farm, garden, and orchard products of all kinds, and grain and forage crops of all kinds.

(2) **Nursery and ornamental stock:** Nursery, ornamental, and greenhouse stock and all other plants and plant roots.

(3) **Sand, soil, earth, peat, compost and manure:** Sand, soil, earth, peat, compost and manure of any kind and as to either bulk movement or in connection with farm products or nursery and ornamental stock.

It is therefore ordered by the State Plant Board of Mississippi that the introduction into the State of Mississippi of the plants and plant products and other articles above listed as infested or likely to become infested with this insect pest from the areas now designated by the Federal Horticultural Board in its regulations supplemental to its notice of Quarantine No. 48 as infested areas, and from all other areas that may be hereafter found to be infested is hereby prohibited: Provided, That nursery stock and greenhouse stock and the other articles enumerated above may be brought into the State of Mississippi from above designated areas when found upon inspection to be free from infestation of Japanese beetle and shall have been prepared and shipped in accordance with the rules and regulations of the Federal Horticultural Board and shall have attached thereto a valid certificate of the Federal Horticultural Board to that effect, and shall in other respects conform to the rules and regulations of the State Plant Board of Mississippi applying to the shipment of nursery stock into the State.

Rule 52—In order to prevent the introduction into the State of Mississippi of the destructive insect pest known as the green Japanese beetle (*Popillia japonica* Newm.) the shipment into the State of Mississippi of plants and plant products listed in the public notice of the State Plant Board of Mississippi, from areas in the United States classed by

the Federal Horticultural Board as being infested with this insect, is hereby prohibited, except when such shipments are accompanied by a certificate of the Federal Horticultural Board and in addition thereto shall conform to all regulations of the State Plant Board of Mississippi applying to the shipment of nursery stock into the state. It is further provided that farm products from the areas in the United States infested by the green Japanese beetle may move into Mississippi without restrictions from October 1, to June 15, each year.

Rule 53 (Old Rules 53 A and 54)—In order to prevent the dissemination of black rot, stem rot, sweet potato weevil and other injurious insects and diseases of the sweet potato the movement or shipment in the State of Mississippi of sweet potatoes for planting purposes, sweet potato plants, or vines is hereby prohibited, except when such shipments have attached to each container a certificate tag issued by the State Plant Board.

Certificate tags shall be issued only after the seed potatoes or plants have passed the proper inspections in field, storage or bed and the grower has complied with all requirements deemed necessary by the State Plant Board to prevent the dissemination of injurious insects and diseases.

Certificate tags shall be numbered serially and all tags used shall be reported to the State Plant Board in such manner as may be prescribed. Certificate tags may be recalled by the Chief Inspector at his discretion.

Rule 54 (Old Rule 53 B.)—The movement or shipment into the State of Mississippi of sweet potatoes, sweet potato plants and vines, and of all morning glory plants or parts of plants from points outside of the State of Mississippi is prohibited except when such shipments have attached to each container a permit certificate tag of the State Plant Board.

Permit certificate tags may be obtained by filing with the State Plant Board a certificate of inspection from the proper inspection official of the state wherein the shipments

originate showing that the potatoes, plants, potato fields, beds, and the premises of the person desiring to make the shipments have met requirements specified by the State Plant Board. Permit certificate tags may be recalled by the Chief Inspector at his discretion.

**Rule 55—Repealed.**

**Rule 56 A—All hay shipments entering Mississippi must bear permits.**—In order to prevent the introduction into Mississippi of the very destructive insect enemy of alfalfa known as the Alfalfa Leaf Weevil (*Phytonomus posticus*) the shipment into Mississippi of alfalfa hay and all other kinds of hays from all states other than California, Colorado, Idaho, Nevada, Oregon, Utah, and Wyoming, and from all other states which may hereafter be found to be infested with the Alfalfa Weevil, is hereby prohibited, except when waybills covering such shipments are accompanied by a permit of the State Plant Board issued by the Chief Inspector.

**Rule 56 B—How permits may be obtained.** Permits may be issued by the Chief Inspector for the shipment of materials mentioned in paragraph (A) above upon satisfactory evidence that such materials were produced wholly in states other than California, Colorado, Idaho, Nevada, Oregon, Utah, Wyoming, and other states which may hereafter be found to be infested with the alfalfa weevil.

**Rule 56 C—Before accepting shipments of hay destined for points in Mississippi,** transportation agents will see that proper permit is surrendered, by the shipper, this permit to accompany way-bill to destination and be kept on file at that point by transportation agent.

**Rule 57—The movement, handling, or distribution of any cans of poisoned syrup put out under the direction of the State Plant Board in order to control the Argentine Ant in any town, city, or county in Mississippi,** is hereby prohibited, except when done by an employee of the State Plant Board, or under the direction of the State Plant Board.

# Orders and Regulations Of The Postoffice Department

## Relative to Parcel Post Shipments of Nursery Stock and Certain Other Plants and Plant Products.

Nursery Stock—Not Admitted to Mails Unless Accompanied by Certificate of Inspection:

Paragraph 2 of Section 467 of the Postal Laws and Regulations reads as follows:

“2. Nursery stock, including all field-grown florists’ stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit pits and other seeds of fruit and ornamental trees or shrubs, and other plants and plant products for propagation, except field, vegetable, and flower seeds, bedding plants and other herbaceous plants, bulbs, and roots, may be admitted to the mails only when accompanied with a certificate from a State or Government inspector to the effect that the nursery or premises from which such nursery stock is shipped has been inspected within a year and found free from injurious insects, and plant diseases and the parcel containing such nursery stock is plainly marked to show the nature of the contents and the name and address of the sender.”

## Terminal Inspection of Plants and Plant Products Addressed to Mississippi Postoffices

The following order was issued by Mr. A. M. Dockery, Third Assistant Postmaster General, under date of October 16, 1920:

“Third Asst. Postmaster General

Washington, October 16, 1920.

“The State of Mississippi has established places for the terminal inspection of plants and plant products under

the provisions of the act of March 4, 1915, embodied in Section 478  $\frac{1}{4}$ , Postal Laws and Regulations, appearing on page 49 of the May, 1915, supplement to the Postal Guide. (1).

"All postmasters are, therefore, informed that packages containing plants or plant products addressed to places in the State of Mississippi may be accepted for mailing only when plainly marked so that the contents may be readily ascertained by the inspection of the outside thereof. The law makes the failure so to mark such parcels an offense punishable by a fine of not more than \$100.

"The plants and plant products subject to terminal inspection in the State of Mississippi are described as follows:

" 'All florists' stock, trees, shrubs, vines, cuttings, grafts, scions, buds, fruit pits, and other seeds of fruit and ornamental trees or shrubs; all greenhouse, herbaceous, and bedding plants and parts thereof; all blossoms or flowers of orange, lemon, and other citrus plants; all fruits and nuts; cotton seed; all herbarium or dried specimens of plants or parts thereof, and other plants and plant products in the raw or unmanufactured state, except vegetable and flower seed,

(2) Provided, That this list of plants and plant products shall not apply to—

" '(1) Plants and plant products shipped under the certificate of the Federal Horticultural Board of the United States Department of Agriculture. (3).

" '(2) Plants and plant products originating in Mississippi and addressed to places in that State which are enclosed in packages plainly marked to show the nature of the con-

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(1) Section 468 Postal Laws and Regulations, pages 468-470, Edition of 1924, effective July 1, 1924.

(2) An order of the Post Office Department exempts such vegetable plants as cabbage, tomato, egg plant and pepper plants from the inspection requirements when shipped into Mississippi from another state.

(3) Plants and plant products shipped into Mississippi under certificates of the Federal Horticultural Board are no longer exempted from terminal inspection according to an order issued by Mr. W. Irving Glover, Third Assistant Postmaster General, July 15, 1924.

tents and are accompanied with a certificate from the Mississippi State Plant Board or its duly authorized inspector embodying the information prescribed in paragraph 2, Section 478, Postal Laws and Regulations; (4).

“(3) Cut flowers (such as roses, carnations, etc.) other than those of citrus plants; field crop seeds (such as cotton, corn, oats, rye, etc.); garden and vegetable plants (such as tomato, eggplant, etc.) other than sweet potato draws or slips; grains (such as rice, wheat, corn, etc.); grass seeds (such as Natal grass seed, timothy seed, etc.); nuts (such as pecans, walnuts, etc.); vegetables for table use (such as Irish potatoes, rhubarb, celery, tomatoes, etc.) other than sweet potatoes, when both the office at which such plant products are mailed and the office to which they are addressed are located in Mississippi.’

“Postmasters within the State of Mississippi shall be governed strictly by the provisions of paragraphs 3, 4, 5 and 6, Section 478 $\frac{1}{4}$  (1), Postal Laws and Regulations, in the treatment of all packages addressed for delivery at their offices containing any of the plants or plant products above described and subject to terminal inspection.

“Inspection service is maintained at the places in Mississippi named below, and all Postmasters in that State shall after receiving the required postage thereof, under the provisions of Section 478 $\frac{1}{4}$  (1) Postal Laws and Regulations, send to the nearest inspection point each package containing plants or plant products subject to terminal inspection:

Agricultural College (5) Ocean Springs (6)

(4) Paragraph 2 Section 467, Postal Laws and Regulations of 1924.

(5) Agricultural College changed to A. & M. College.

(6) Additional postoffices where terminal inspection of plants and plant products is maintained in Mississippi:

Biloxi	Laurel	Poplarville
Corinth	Leland	Raymond
Durant	McComb	Starkville
Gulfport	Meridian	Tupelo
Hattiesburg	Moss Point	Water Valley
Holly Springs	Natchez	West Jackson
Jackson	Pascagoula	

"Owing to the perishable character of plants or plant products, the package containing such matter must be given prompt attention.

"Any failure of compliance with the foregoing instructions or with the provisions of Section 478 $\frac{1}{4}$ , Postal Laws and Regulations, coming to the attention of any postmaster should be reported to the Third Assistant Postmaster General, Division of Classification.

"A. M. Dockery,

"Third Assistant Postmaster General"

### Section 468 P. L. & R.

Section 468 of the Postal Laws and Regulations, under authority of which the above Order is issued, and which is referred to therein, reads as follows:

"Sec. 468. (a) When any State shall provide for terminal inspection of plants and plant products, and shall establish and maintain, at the sole expense of the State, such inspection at one or more places therein, the proper officials of said State may submit to the Secretary of Agriculture a list of plants and plant products and the plant pests transmitted thereby, that in the opinion of said officials should be subject to terminal inspection in order to prevent the introduction or dissemination in said State of pests injurious to agriculture. Upon his approval of said list, in whole or in part, the Secretary of Agriculture shall transmit the same to the Postmaster General, and thereafter all packages containing any plants or plant products named in said approved lists shall, upon payment of postage therefor, be forwarded by the postmaster at the destination of said package to the proper State official at the nearest place where inspection is maintained. If the plant or plant products are found upon inspection to be free from injurious pests, or if infected shall be disinfected by said official, they shall upon payment of postage therefor be returned to the postmaster at the place of inspection to be forwarded to the person to whom they are addressed; but if found to be infested with injurious

pests and incapable of satisfactory disinfection the State inspector shall so notify the postmaster at the place of inspection, who shall promptly notify the sender of said plants or plant products that they will be returned to him upon his request at his expense, or in default of such request that they will be turned over to the State authorities for destruction.

“(b) It shall be unlawful for any person, firm, or corporation to deposit in the United States mails any package containing any plant or plant product addressed to any place within a State maintaining inspection thereof, as herein defined, without plainly marking the package so that its contents may be readily ascertained by the inspection of the outside thereof. Whoever shall fail to so mark said packages shall be punished by a fine of not more than \$100.

“(c) The Postmaster General is hereby authorized and directed to make all needful rules and regulations for carrying out the purposes hereof.

“2. When the Secretary of Agriculture furnishes the Postmaster General a list of plants and plant products subject to terminal inspection under provisions of the preceding paragraph, appropriate instructions in regard thereto shall be issued to postmasters by the Third Assistant Postmaster General, Division of Classification.

“3. When a package containing plants or plant products subject to terminal inspection is received at the post office of address, the postmaster shall at once notify the addressee of the required amount of postage for forwarding it to the place of inspection and return. Upon payment of the required amount, the postmaster shall affix to the parcel stamps sufficient to cover the postage from his office to the place of inspection, and place in an official envelope, to be attached to the parcel and addressed to the postmaster at the place of inspection, the stamps representing the amount of postage furnished by the addressee for its return. The postmaster shall then endorse on the wrapper of the parcel



the words, "Forward to \_\_\_\_\_ , for  
(Give post office of inspection)

inspection," and transmit the parcel to the postmaster at the place of inspection.

"4. (a) On receipt of the parcel at the post office of inspection the postmaster shall deliver it to the proper State official, and if such official shall return it to him marked to show that it has been inspected and passed, the postmaster shall affix to the parcel the postage furnished for returning it to the post office of address and promptly transmit it to that office. It shall then be delivered to the addressee.

"(b) If the State official to whom a parcel containing plants or plant products has been sent for inspection shall inform the postmaster at the place of inspection that such plants or plant products are infected with injurious pests and incapable of satisfactory disinfection, the postmaster shall promptly notify the sender that the parcel is undeliverable, giving the reason therefor together with the name and address of the addressee, and stating the amount of postage required for its return and that if the postage is not promptly furnished the parcel will be turned over to the State authorities for destruction. After the sending of such notice, the postmaster shall wait the length of time prescribed in paragraph 8, Section 614, when, if postage be not received by that time, he shall inform the State authorities that the parcel may be destroyed by them.

"5. When a parcel containing plants or plant products is returned to the sender or destroyed under the provisions of the preceding paragraph, the postage stamps representing the amount of postage furnished by the addressee for the return of such parcel from the post office of inspection to the office of address shall be sent by the postmaster at the former office to the addressee together with a letter of information as to the disposition of the parcel.

"6. If the addressee, after having been notified, as prescribed in paragraph 3 of this section, fails to furnish the required postage for sending the parcel to the place of inspection and return, the postmaster shall so notify the State

Inspector at that place and advise him of the amount of postage required for sending the parcel to him. If such official furnishes the postage the postmaster shall, after affixing the necessary stamps, indorse on the wrapper of the parcel the words 'Forward to \_\_\_\_\_ for inspection,' together with the words 'Postage paid by State,' and transmit it to the postmaster at the place of inspection.

If the State Inspector shall return the parcel to the postmaster at the point of inspection, marked to show that it has been inspected and passed, and having postage properly prepaid, it shall be transmitted to the office of address and delivered to addressee. Should the State Inspector fail to furnish the postage for sending the parcel to him for inspection, the parcel shall be treated as other undeliverable fourth-class matter, as prescribed in Section 614."

### Summary

Under the provisions of the foregoing Order of the Third Asst. P. M. General and under the Sections of the Postal Laws and Regulations referred to:

All packages of plants and plant products tendered for mailing to points in Mississippi, must be plainly labeled to show the nature of the contents.

A list of the various plants and plant products subject to inspection is given in the Order quoted above.

Parcel post packages of plants and plant products, originating in Mississippi, bearing the inspection certificate tag of the State Plant Board of Mississippi, when addressed to Mississippi points may be sent direct to the addressee, as it is not required that such packages be sent to a terminal inspection point before delivery is allowed.

All packages of plants and plant products (except vegetable and flower seeds and also cabbage, tomato, egg plant and pepper plants) from other states addressed to Mississippi post offices must be sent to terminal inspection points upon arrival in Mississippi.

An inspection certificate issued by the state official of any state other than Mississippi, or the Federal Horticultural Board, does not entitle plants or plant products to delivery in Mississippi without being subjected to terminal inspection.

Mississippi Permit Tags accompanying mail shipments of plants or plant products originating in another state, addressed to Mississippi post offices do not exempt such shipments from terminal inspection.

Mail shipments of plants and plant products originating in Mississippi, but addressed to post offices in other states, are not subject to inspection by Mississippi authorities. However, paragraph 2 of Section 467 P. L. & R., quoted above, requires that all mail shipments of nursery stock (regardless of destination) shall have an official certificate of inspection attached when tendered for mailing.

All packages of plants or plant products (except as previously noted) addressed to post offices in Mississippi, are subject to inspection and are required to be sent to the nearest point where terminal inspection is maintained. These inspection points are:

A. & M. College	Laurel	Pascagoula
Eiloxi	Leland	Poplarville
Corinth	McComb	Raymond
Durant	Meridian	Starkville
Gulfport	Moss Point	Tupelo
Hattiesburg	Natchez	Water Valley
Holly Springs	Ocean Springs	West Jackson
Jackson		

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

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Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
D. C. NEAL, Plant Pathologist ..... Associate Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

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## CITRUS CANKER SCOUTING REPORT

For the Period January 1, 1925, to March 31, 1925

Number of counties in the state which have at one time or another since 1916 shown canker .....	4
Number of counties showing canker January 1, 1925, to March 31, 1925 .....	0
Number of grove trees inspected January 1, 1925, to March 31, 1925 .....	11,177
Number of nursery trees inspected January 1, 1925, to March 31, 1925 .....	83,106
Number of C. trifoliata inspected January 1, 1925 to March 31, 1925 .....	200,433

Total number of grove trees found infected June 1, 1916 to March 31, 1925 -----	3,117
Total number of nursery trees found infected June 1, 1916 to March 31, 1925 -----	51,167
Number of properties infected during 1916-----	108
Number of properties infected during 1917-----	47
Number of properties infected during 1918-----	14
Number of properties infected during 1919 -----	4
Number of properties infected during 1920 -----	0
Number of properties infected during 1921 -----	1
Number of properties infected during 1922-----	8
Number of properties infected during 1923, 1924, and 1925 -----	0
Number of new properties infected during 1917----	12
Number of new properties infected during 1918----	1
Number of new properties infected during 1919 and 1920 -----	0
Number of new properties infected during 1921----	1
Number of new properties infected during 1922----	8
Number of new properties infected during 1923, 1924, and 1925 -----	0
Total number of properties found infected June 1, 1916 to March 31, 1925 -----	130
Total number of properties declared no longer danger centers -----	130

# REPORT OF NURSERY INSPECTOR FOR QUARTER ENDING MARCH 31, 1925

Number of nurseries inspected .....	113
Acreage in nurseries inspected .....	192.3
Amount of Nursery Stock Inspected:	
Grafted and budded pecans .....	47,366
Seedling pecans .....	161,325
Total pecans .....	203,691
Citrus trifoliata .....	509,800
Orange .....	52,710
Grapefruit .....	1,000
Kumquat .....	2,000
Miscellaneous citrus .....	3
Total citrus .....	565,513
Apple .....	12,015
Pear .....	94,040
Peach .....	16,450
Fig .....	4,075
Grape .....	10,525
Plum .....	674
Japanese Persimmon .....	800
Strawberry .....	550,000
Blueberry .....	12,000
Miscellaneous fruit .....	500
Total fruit (citrus excluded) .....	701,079
Kudzu .....	2,000
Total kudzu .....	2,000
Rose .....	24,735
Miscellaneous ornamental .....	677,578
Total ornamental .....	702,313
Grand total of plants inspected during quarter .....	2,179,596

**QUARANTINE INSPECTION REPORT****For Period from January 1 to March 31, 1925.***(Geo. F. Arnold, Quarantine Inspector)***Ships and vessels inspected:**

From foreign ports -----	8
From U. S. ports -----	0
Total -----	8

**Parcels inspected:**

Arriving by water -----	0
Arriving by land: express, freight, wagon, etc.—	
Passed -----	1502
Treated and passed -----	1
Returned to shipper -----	6
Contraband destroyed -----	17
Total -----	1526

**Arriving by mail:—**

Passed -----	2093
Treated and passed -----	36
Returned to shipper -----	3
Contraband destroyed -----	31
Total -----	2163
Grand total of parcels inspected -----	3639

**Number of parcels on hand March 31, 1925, pending determination as to final disposition -----**

determination as to final disposition -----	15
Total parcels passed -----	3595
Total parcels treated and passed -----	37
Total parcels returned to shipper -----	9
Contraband destroyed -----	48
Grand total -----	3689

**THE QUARTERLY BULLETIN**  
— OF THE —  
**STATE PLANT BOARD**  
**OF MISSISSIPPI**

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**VOL. 5**

**JULY, 1925**

**No. 2**

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**PUBLISHED BY**  
**STATE PLANT BOARD OF MISSISSIPPI**  
**A. & M. COLLEGE, MISSISSIPPI**

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Entered as second-class matter July 9, 1921, at the post office at  
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### **MEMBERS OF BOARD**

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**R. W. HARNED, Secretary** ----Entomologist, A. & M. College, Miss.

# A New Bacterial Disease of Alfalfa in Mississippi

*By D. C. Nicol, Plant Pathologist*

A new bacterial disease of alfalfa has recently been found in parts of Mississippi and other alfalfa producing regions. This disease was first observed in September, 1924, in northern Illinois by Dr. F. R. Jones, Pathologist, Bureau of Plant Industry, U. S. Department of Agriculture, who is specializing on alfalfa diseases. Since this time the disease has been found in Washington County, Mississippi, and in several fields in Kansas, Colorado, Iowa, and other states. Undoubtedly the disease has been present in Mississippi and other regions for several years, but only recently was it definitely known that the alfalfa failures reported in certain parts of this State were due largely to this new bacterial disease of alfalfa root and stem.

*Symptoms.*—The general symptoms of affected plants are usually weak, spindling foliage or shoots, stunted or typically dwarfed as compared with healthy plants. The foliage is usually faintly yellow and occasionally may wilt in extreme cases, and after cutting no new shoots are developed. Vigorous stands of alfalfa may be destroyed in a single season, or the plants may be so stunted by the disease as to materially curtail the yield. Tap roots of infected plants are typical in that they show a brown discoloration under the bark, which in advanced cases will slip readily from the root leaving a woody core yellow on the outside but commonly of the usual white color at the center. Microscopic examinations of these discolored roots reveal that the color is associated with the presence of masses of bacteria in a large number of the outermost vessels of the wood. The bacterial mass may later become darker, and finally the vessels are filled with a yellow residue. The bacteria may also be found in the inmost vessels of the stems.

*Dissemination and Control.*—Dissemination of the disease in individual fields appears to be brought about at mowing time, the bacteria getting on the knife blades and, of course, being carried to healthy plants. It is not known yet whether the disease attacks other plants, particularly legumes, or whether it is seed borne. In view of the fact, however, that this disease has been reported in a number of the alfalfa seed producing regions, it may be that the matter of dissemination of the disease by infected seed is probable. Until these facts are made known, control measures must concern themselves with long periods of rotation with the hope of starving out the disease. In fields with a minimum of infection, eradication measures would appear worthy of trial. In such instances infected plants should be destroyed, care being taken to dig out the plant including the entire root system. This should be thorough, and the soil in and around the affected area should be disinfected by saturating with a solution of formaldehyde made at the rate of 1 pint of formaldehyde diluted in 12 gallons of water.

The State Plant Board is anxious to know the exact distribution of this disease in Mississippi; and any alfalfa plants suspected of having this trouble should be mailed promptly to the Plant Pathologist, A. & M. College, Mississippi, for examination.

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## Fire Blight of Apple and Pear

*By J. M. Wallace, Assistant Plant Pathologist*

Fire blight is the most serious disease of apple and pear with which the growers of Mississippi have to contend. It is the most universally destructive disease of all pomaceous fruits in the United States, occurring not only on apple and pear, but also on quince, apricot, cherry, plum, and prune. However, it is considered a minor disease on all except pear, apple, and quince. Fire blight is also known by other names,

as pear blight, blossom blight, twig blight, fruit blight, blight canker, apple blight, and collar blight. Trees may be entirely killed by this disease or they may have their vitality lowered so that growth is slow and the yield small. In some cases trees may have fire blight without showing any appreciable decrease in general vigor or yield. This may be due either to resistance of the individual tree or unfavorable conditions for the development of the disease.

Fire blight is a bacterial disease caused by a bacterium known as *Bacillus amylovorus*. The bacterium enters the host through the blossoms, tender growing tips of twigs, and wounds in the bark. The bacteria pass the winter in an inactive condition in the tissues along the margin of blight cankers; such lesions are sometimes called "hold-over" cankers. In the spring the bacteria become active, multiply rapidly, and spread into adjoining healthy tissues. Great numbers of them sometimes ooze forth in sticky masses from the infected portions. This ooze is visited by bees, wasps, flies, beetles, aphids and other insects which may carry the bacteria to healthy trees thereby causing new infection. The first evidence of the disease in the spring is in the form of blossom blight, the tender tissues of the blossom and of the embryo fruit being killed suddenly. From the blossom the bacteria work their way down the pedicel to the spur, killing the bark and causing the leaves as well as the blossoms to wither. Fruit blight may occur either from the bacteria which come down through the pedicels or from those which have been deposited in the fruit by the curculio or other insects.

The cankers on the larger limbs or trunks are usually slightly sunken and blackened. The bark along their edge is often rough and cracked. Such cankers usually occur at points where the organism has travelled down a small twig, a sucker, or fruit spur. This is "canker blight" and the lesions, as already stated, are known as hold-over cankers.

Fire blight is very easy to recognize in almost all of its different forms. However, the most striking symptom to be

recognized by the grower is that of twig-blight. The affected twig is blackened and bears darkened, drooping leaves, the whole appearing as if burned by fire. The leaves cling tenaciously to the dead branches, frequently remaining throughout the winter after all the other leaves have fallen. This fact aids the grower in determining which branches to prune out when attempting to control fire blight.

Fire blight should not be confused with winter-injury. The two conditions can be distinguished from each other very readily. Fire blight shows up suddenly, sometimes only one branch or a portion of a branch being killed. In contrast with that, winter injury manifests itself by a general wilting and uniform discoloration of all foliage simultaneously.

Fire blight is one of the most difficult orchard diseases to control. Pruning, carefully and properly done, is the only means of dealing with it. In attempting to control fire blight one should keep in mind the following points: (1) That this disease occurs in practically all pome fruit growing sections of North America, and therefore there is always a source from which the bacteria may come. (2) That all varieties of the hosts on which fire blight occurs are more or less susceptible; some are more resistant than others but so far as known, none are immune. (3) That the bacteria may enter the host through wounds or blossoms or possibly directly into new succulent growths. (4) That many insects aid in disseminating the bacteria.

Considering the above points one would see that to control this disease the most logical thing to do is to keep down the source of inoculum. Control measures have been summarized as follows:

(1) Inspect trees in fall and in spring before blossoms open. At the time of both inspections cut out thoroughly all blighted branches and hold-over cankers found on the trees. The heaviest pruning should be done while the trees are dor-

mant, preferably early in the fall while the blighted leaves are still on the tree, as they aid in locating diseased areas and cankers. Small branches should be cut back from twelve to eighteen inches below the signs of disease. In larger branches or on the trunk, the diseased area may be removed by cutting out all the dead wood and bark well into the bright clean tissue, leaving the wound smooth. Use a sharp knife and leave the lower part of the cut V-shaped to allow good drainage. Inspect thoroughly and remove all cankers.

(2) Disinfect the wounds described above with a solution of corrosive sublimate (one ounce to eight gallons of water). Keep this solution in wooden, glass, or porcelain vessels as it reacts with metals and rapidly loses its strength when kept in metal containers. *It is a deadly poison and should be kept away from animals and children*. After the wounds are dry they should be painted with a good lead and oil paint.

(3) During the growing season the orchard should be inspected each week and every blighted twig, sucker, or spur pruned out, cutting at least a foot below the lowest sign of the disease. After making each cut, disinfect the pruning instrument by wiping on a clean cloth moistened with the corrosive sublimate solution described above. Burn the blighted material promptly after removal. All suckers and water sprouts on the large limbs and trunks should be removed, since they are especially susceptible and often allow the entrance of the organism in such a manner as to form hold-over cankers.

(4) Avoid forcing sappy wood growth by too frequent cultivation or too heavy application of fertilizers. See that the trees are not too close together, as close planting retains the soil moisture, favors rapid growth, and thus is conducive to blight. It is advisable to plant the orchard to a sod and to do everything to promote a slow growth, as this insures a hard wood difficult for the blight organism to penetrate.

(5) Cooperation with neighbors should be secured if possible as the disease is carried for considerable distances by insects. In addition to the apples and pears, watch the quinces, haws, wild crabs, and related plants in the vicinity as they are susceptible and may serve as a means for holding over the disease germs.

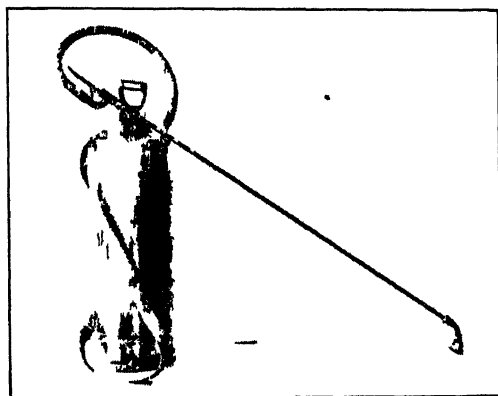
There seems to be considerable difference in the degree of susceptibility of different varieties. Of pears, the sand pear is practically immune, with Kieffer and Duchess usually showing fair resistance. Bartlett, Clapp, and Le-Conte are said to be very susceptible. Among apples, the Ben Davis, Winesap and Mammoth Black Twig are mentioned as being more resistant to fire blight than any other varieties. However, this apparent resistance may not be due to any inherent difference among kinds of apples and pears, but there is a possibility that it might be traced to environmental conditions and other factors which are frequently overlooked. The source and amount of inoculum, the presence of insects, the period of growth activity, and the climatic conditions play a great part in the prevalence of fire blight.

### CONTROL TURNIP LICE THIS FALL

During each fall the State Plant Board receives hundreds of complaints about plant lice or aphids on turnips, mustard and other crops. As the lice are feeding on the under sides of the leaves, many people find it difficult to control them. However, with the outfit shown in the accompanying illustration, spray can be easily applied to the under sides of the leaves if the plants are in rows.

This compressed air pump holds about 3½ gallons and is equipped with a trigger shut-off. The extension rod shown is 3 feet long, and is fitted with an elbow and an angle nozzle. This outfit will also be excellent for spraying melons or any other low-growing crop.

One of the most satisfactory solutions for controlling plant lice consists of 6 ounces ( $\frac{3}{8}$  pint) of nicotine sulphate in 50 gallons of water, in which 2 pounds of good laundry soap has been dissolved. If only a small amount of spray is needed, use 1 teaspoonful nicotine sulphate and an inch cube of soap in 1 gallon of water. If the nicotine sulphate is diffi-



Spraying Equipment for Controlling Plant Lice on Turnips.

cult to obtain, a very satisfactory spray may be made with 1 pound of good laundry soap in 7 gallons of water. This will usually be the cheapest spray, as well as the easiest prepared.

The important point in spraying lice is to hit them with the spray, and whenever one of the above sprays fails to control these pests it is usually due to lack of attention to this essential point. Turnips and mustard should be planted in rows, as the plants can be sprayed much more easily than when the seed are broadcasted. In fact, except for small areas in gardens, spraying of broadcast turnips can hardly be recommended on account of the time and labor required.

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### ARGENTINE ANT CAMPAIGNS SUCCESSFUL

The Argentine Ant control campaigns put on in 19 Mississippi towns last fall in cooperation with the State Plant



Board have been the most uniformly successful in the history of this work. Recent house-to-house investigations by Plant Board inspectors in some of the towns have shown the results tabulated below. In making these investigations, if no ants had been seen in the house since the poison was put out, the control for that property was recorded as "good"; if only a few ants had been noticed, it was reported as "fair"; if the ants were still numerous, the control was reported as "poor." In most towns 100% satisfactory control was secured. The poor results in a few cases are chiefly due to the removal of the poison cans by children, or to lack of a sufficient amount of poison.

Towns	People Interviewed	Reporting "Good"	Reporting "Fair"	Reporting "Poor"	Per Cent "Poor"	Per Cent "Satisfactory"
Belzoni -----	17	16	1	0	0	100%
Booneville -----	72	72	0	0	0	100%
Columbus -----	100	92	8	0	0	100%
Clarksdale -----	157	153	0	4	2.5%	97.5%
Durant -----	60	42	17	1	1.6%	98.4%
Fernwood -----	22	18	4	0	0	100%
Greenville -----	51	50	0	1	1.9%	98.1%
Macon -----	100	88	11	1	1%	99%
Magnolia -----	46	43	3	0	0	100%
Pascagoula -----	97	93	4	0	0	100%
Pass Christian --	142	138	4	0	0	100%
Picayune -----	50	48	2	0	0	100%
Shaw -----	20	20	0	0	0	100%
Starkville -----	100	68	32	0	0	100%
West Point -----	85	77	8	0	0	100%

In some towns, especially Columbus, Greenville, and Pass Christian, the ants have been reduced to such an extent that many of the citizens are now hoping for complete eradication in another year or two. This seems quite pos-

sible, and if thorough campaigns are continued, the Plant Board will make special efforts to assist these towns in achieving the desired end. Fayette, in Jefferson County, has apparently succeeded in accomplishing this result, as no Argentine Ants have been found there during the past two years.

The campaigns during the past year were equally as successful as those in the fall of 1923, results of which are shown below:

Towns	People Interviewed	Reporting "Good"	Reporting "Fair"	Reporting "Poor"	Per Cent "Poor"	Per Cent "Satisfactory"
Columbus -----	100	98	2	0	0	100%
Fayette -----	25	25	0	0	0	100%
Greenville -----	48	46	2	0	0	100%
Itta Bena -----	57	56	1	0	0	100%
Magnolia -----	47	45	2	0	0	100%
McComb -----	200	170	30	0	0	100%
Meridian -----	200	181	19	0	0	100%
Pascagoula -----	100	92	8	0	0	100%
Pass Christian --	168	139	27	2	1.13	98.87%
Summit -----	30	22	8	0	0	100%
Vicksburg -----	200	152	39	9	4.5	95.5%

Efforts are being made now to enlist more cities in the fight against the ants this fall than ever before. City councils are being urged to make their appropriations promptly, in order that the campaigns may start without delay in September and October. For any information in regard to a campaign against the Argentine Ant, address the Entomologist, State Plant Board, A. & M. College, Miss.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist	Editor
D. C. NEAL, Plant Pathologist	Associate Editor
HUNTER H. KIMBALL	Associate Editor
CLAY LYLE	Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## BEWARE OF PEDDLERS OF ANT POISON

As peddlers have endeavored to sell Argentine Ant poison on the streets of several Mississippi towns this summer, the State Plant Board has issued a warning to all ant-infested towns of the State, advising them not to buy poison from peddlers for the following reasons:

1. The peddlers may be selling a worthless product.
2. They are charging two or three times the price of the poison when bought in cooperative campaigns.
3. Summer is not the best time of the year to put out Argentine Ant poison, as much better results are secured in September and October.

4. From reports received, the cans contain only a small amount of poison and the ants will soon leave them

5. With this method, there is no hope for eradication, for some of the people will buy poison while others will not.

6. With this method, even those who do buy poison must keep it up indefinitely, for ants will be coming continually from the homes of their neighbors who do not buy poison.

7. These peddlers destroy the spirit for any organized movement against the ants, for they probably sell several influential citizens, who, having temporarily protected their homes, are then not interested in a cooperative campaign to protect other homes and other parts of town. This is unfortunate, for the amount of money spent by a few people buying poison individually, if used collectively in buying large quantities at low prices, would be sufficient to poison the ants over the entire town.



In Memory of  
**Ralph Paul Barnhart**

The news of the death of Mr. R. P. Barnhart, Inspector of the State Plant Board, with headquarters at Ocean Springs, on July 21, cast a shadow of sadness over the entire personnel of this organization.

Mr. Barnhart was born in Wabash County, Indiana, October 24, 1875. He moved to Chicago in his early youth and was a traveling salesman for a while. Later he worked for several years with the Illinois Steel Company. In 1913, he married Miss Elizabeth Knickerbocker of Aurora, Illinois, and moved immediately to Ocean Springs, Mississippi, where he developed an orange and pecan orchard. Early in 1918 he became connected with the Federal Bureau of Plant Industry in the eradication of citrus canker in the coast counties of Mississippi. Later he became an inspector of the State Plant Board and was put in charge of the citrus canker work. The complete eradication from Mississippi of this dreadful citrus disease is due in no small measure to his personal efforts. In addition to his services to the citrus growers of Mississippi, Mr. Barnhart was also a pioneer in the development of the present successful method of controlling pecan scab. Results of some of his experiments in the control of this serious disease are to be published this year. He also rendered valuable service to the people of his section in many other lines of insect pest and plant disease control.

Mr. Barnhart was held in the highest esteem by his colleagues and friends. His devotion to duty, frank, genial good nature, and sincere interest in his work, won the love and respect of everybody who knew him. Sincere expressions of loss and sorrow from many of those to whom he rendered service as a Plant Board inspector, indicate the place he held in their lives. His loss is a severe blow to the Plant Board, but his life, work and character will continue to give inspiration to those of us who still "carry on."

STATE PLANT BOARD OF MISSISSIPPI



RALPH PAUL BARNHART

# **APIARY INSPECTION REPORT**

**For Period April 1-June 30.**

County	Frame Hives	Box Hives	European Foulbrood	American Foulbrood
Adams -----	11	1	----	----
Bolivar -----	1	1	----	----
Coahoma -----	5	----	----	----
Franklin -----	19	----	----	----
George -----	28	12	----	----
Harrison -----	32	----	----	----
Humphreys -----	11	----	----	----
Jackson -----	41	15	----	----
Jones -----	36	----	----	----
Lee -----	125	----	----	----
Leflore -----	6	3	----	----
Lowndes -----	1574	2	----	----
Noxubee -----	897	----	----	----
Sharkey -----	--	1	----	----
Sunflower -----	3	----	----	----
Washington -----	496	21	170	40
Yalobusha -----	34	7	----	----
Total -----	3319	63	170	40

The above report does not show the total number of hives in any county, as many of the inspections were made just as the opportunity occurred, while the inspectors were engaged in other work. Last fall, through burning and shaking, American Foulbrood was apparently eradicated from Washington County. However, it was expected to show up again this year, and 40 infected colonies were found during the past quarter. The clean-up work will be pushed as vigorously as funds will permit. The European Foulbrood situation improved greatly as the season advanced and little was found toward the close of the quarter. Inspections will be made in several other counties during the next quarter.

**REPORT OF NURSERY INSPECTOR****Quarter Ending June 30, 1925**

Number of Nurseries Inspected During Quarter --43  
Acreage in Nurseries Inspected During Quarter --71 38 100  
Amount of Nursery Stock Inspected during Quarter:

Grafted and budded pecan -----	55,150
Seedling pecan -----	139,800

Total pecan -----	194,950
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Citrus trifoliata -----	112,525
Orange -----	3,800

Total Citrus -----	116,325
--------------------	---------

Apple -----	3,775
Pear -----	19,500
Peach -----	11,650
Plum -----	800
Grape -----	2,650
Fig -----	1,600
Quince -----	400
Strawberry -----	5,000

Total fruit (citrus excluded) --	45,375
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Rose -----	36,222
Other ornamental -----	465,885

Total ornamental -----	502,107
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Grand total of plants inspected during quarter -----	858,757
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# QUARANTINE INSPECTION REPORT

For Period from April 1, to June 30, 1925

*By Geo. F. Arnold, Quarantine Inspector*

## Ships and vessels inspected:

From foreign ports -----	12
From U. S. ports -----	1
Total -----	13

## Parcels inspected:

Arriving by land: express, freight, wagon, etc.:

Passed -----	476
Treated and passed -----	0
Returned to shipper -----	5
Contraband destroyed -----	18
Total -----	499

Arriving by mail:

Passed -----	1528
Treated and passed -----	10
Returned to shipper -----	5
Contraband destroyed -----	11
Total -----	1554

Grand total of parcels inspected -----2053

Number of parcels on hand June 30, 1925,  
pending determination as to final dis-  
position ----- 13

Total parcels passed -----	2004
Total parcels treated and passed -----	10
Total parcels returned to shipper -----	10
Contraband destroyed -----	29

Grand total -----2053

1521

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 5

OCTOBER, 1925

No. 3

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

### **MEMBERS OF BOARD**

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**R. W. HARNED, Secretary** -----Entomologist, A. & M. College, Miss.

# Plant Certified Seed Irish Potatoes This Time

"Growers of Irish potatoes in Mississippi are often at a loss to explain why their yields are so small, even when the crop is planted on good soil, fertilized highly, cultivated properly, and has seemingly suffered no injury from climatic causes. This reduction in yield is due to several potato diseases, chief of which is mosaic. The only practical method of preventing this loss is the use of disease-free seed each year. Since practically all seed Irish potatoes are produced in the northern and western states, several of these states have provided for the certification of seed potatoes that are so nearly free of disease as to meet the requirements of the inspection officials. Usually two or more field inspections and one or more



**FIG.1—Plants showing typical mosaic symptoms on the lower leaves and much less distinct on the upper leaves. (Miss. Exp. Sta.)**

storage inspections are made, and to be eligible for certification the amount of disease present must not exceed a certain limit. Such certified seed potatoes have given splendid results wherever used. In the South, Louisiana has been a leader in the use of certified seed, planting 22 cars in 1922, 85 cars in 1923, and 255 cars in 1924 ”



FIG 2—Comparison of a healthy plant with mosaic plant. (Miss. Exp. Sta.)

Above is quoted the opening paragraph in Mississippi Experiment Station Circular 60, "Value of Certified Irish Potato Seed in Mississippi", which describes an experiment conducted this year at the Raymond Branch Experiment Station by H. H. Wedgworth, Inspector of the State Plant Board, in cooperation with Assistant Director C. B. Anders, in charge of the Station. Every farmer or gardener in Mississippi should have a copy of this circular, which may be secured from the Agricultural Experiment Station, A. & M. College, Miss.

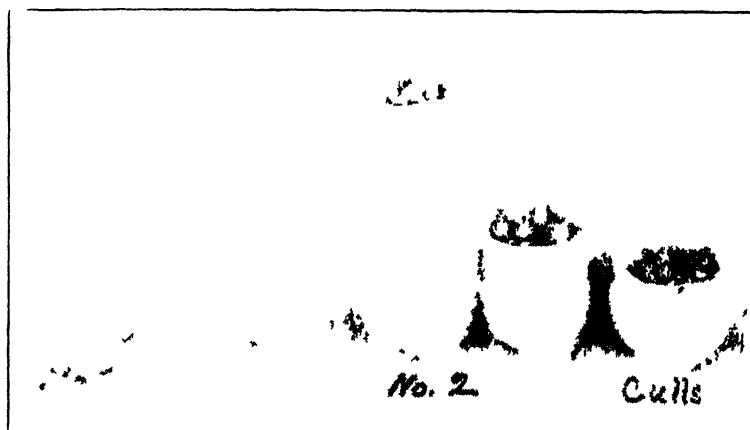


FIG. 3.—Grown from uncertified seed—yield 110.7 bushels per acre.  
(Miss. Exp. Sta.)

Two lots of certified seed from Nebraska and Wisconsin were compared with two lots of uncertified seed purchased from seedsmen in Jackson and Vicksburg. All the lots were given exactly the same treatment in regard to fertilization and cultivation. The following table shows the results of the test:

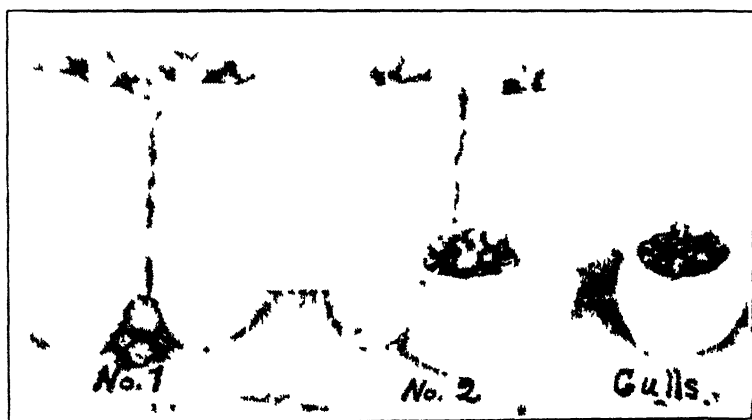


FIG. 4.—Grown from certified Nebraska seed—yield 204.62 bushels per acre. (Miss. Exp. Sta.)

**Comparison of Certified and Uncertified Irish Potato Seed  
on the Percent of Germination, Average Height of  
Plants, Percent of Mosaic Plants, and Yield Per Acre.**

Kind and Source of Seed	Percent of Germination	Average Height of Plants	Percent of Mosaic Plants	Yield Per Acre		
	per cent	inches	per cent	No. 1 bu.	No. 2 bu.	Total bu.
*Uncertified Lot No. 1 Vicksburg, Miss.	90.56	10.61	68.07	36.81	58.98	110.70
*Certified Wisconsin Eagle River, Wis.	99.72	10.18	2.78	83.84	86.11	186.37
*Uncertified Lot No. 2 Jackson, Miss.	93.61	9.74	32.24	33.34	80.14	136.33
*Certified Nebraska Alliance, Neb.	99.17	14.49	2.52	91.51	96.88	204.62

\*Average of three plats.

The certified seed were far superior to the uncertified seed in germination, growth and vigor of plants, and in total yield. The fact that the certified Nebraska seed yielded at the rate of 204.62 bushels per acre as compared with 110.7 bushels from the uncertified seed purchased in Vicksburg, or nearly 94 bushels increase per acre, should prove to anyone growing Irish potatoes that it is folly not to plant certified seed. The cost is but very little more, since all seed potatoes planted in Mississippi are shipped from northern and western states anyhow, and the freight charges will be no greater.

Mosaic disease dwarfs the plants and reduces the yield, as shown in the accompanying illustrations. The disease is widespread in the United States, but seems especially severe in the southern states. It is believed to be transmitted from plant to plant by plant lice and other sucking insects, as well as by other means. It is carried over the winter in the tubers produced by diseased plants, and also passes the winter in the bodies of certain plant lice. It is not advisable to try to save seed Irish potatoes in Mississippi from one year until the next, even from fields planted with certified seed, as a high percentage of mosaic is certain to show up in the next crop. New seed should be bought each year from certified growers in northern and western states.

Individual growers, seed dealers, county farm bureaus, or anyone interested in buying certified Irish potato seed may secure a list of certified growers in northern and western states by writing the State Plant Board, A. & M. College, Miss.

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### EFFECT OF POTASH IN COTTON WILT CONTROL

(Quoted from Miss Exp Sta Press Circular 160, by Asst Director E. B. Ferris, in charge South Mississippi Experiment Station.)

"On land in our main experiment field where cotton has frequently been grown for the past seven years, rust was present everywhere except on plats that had received potash, and wilt was present in several places where it had never been seen before. On two plats where from 1919 to 1924 we had conducted work with fertilizer under cotton, wilt had become so bad by 1924 as to practically destroy the stand.

On one-half of these two plats last named we used in 1925 acid phosphate and nitrate of soda alone, and on the other one-half we used these two with kainit added. The cotton wilted badly over the entire area in 1925, but nothing like so badly where kainit had been used as where it had not been used. The yields on both tests were very low at best, but on the plats without potash they were at the rate of 468 pounds of seed cotton per acre, while on plats receiving potash they were at the rate of 828 pounds per acre. The addition of the potash affected the yield both in its control of rust and in its partial control of wilt. We do not believe that any form of potash will control wilt, but on land deficient in potash we feel sure its addition will give healthier and stronger plants that will better withstand any disease that might attack them."



## MOSAIC-RESISTANT CANE OFFERED TO GROWERS

Through the cooperation of the State Plant Board and the Mississippi Experiment Station, a variety of Java cane, known as Cayana-10, which is much more resistant to mosaic disease than our common sugar cane, has been secured from the U. S. Department of Agriculture and grown during the past season at the South Mississippi Experiment Station. One-sixth of an acre was planted with this variety, which came up to a perfect stand and has grown well. As a result, the South Mississippi Station announces that it will have about four tons of this cane for distribution in small quantities among growers who are troubled with mosaic disease. The cane will be given to growers who request it, and a small charge will be made for cutting and packing. Those wishing to get a start of this cane should write Director E. B. Ferris, South Mississippi Experiment Station, Poplarville, Miss.

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## WHERE BOLL WEEVIL POISONING PAID

By Clay Lyle.

On account of the very dry season and the fact that most farmers in Mississippi made a bumper crop of cotton without using poison, it is the general impression that poisoning did not pay this year. And in most cases this is true. However, there are many instances in which it would have paid well. In several localities Plant Board inspectors found infestations running from 10 per cent to 50 per cent during late June and early July. In some instances, a few showers fell in these sections during July and the weevils undoubtedly did considerable damage, which was probably underestimated, since the yield was much greater than normal anyhow.

A case of this kind is that of a South Mississippi farmer who made a bale per acre on unpoisoned cotton, and would have considered the weevil damage too small to be

taken into account had he not poisoned a few acres, resulting in a yield of  $1\frac{1}{2}$  bales per acre from the poisoned cotton. He also discovered that 1500 pounds of seed cotton from the poisoned field ginned out 62 pounds more lint than an equal amount of seed cotton from the unpoisoned area, due to the damaged locks in the latter.

Director E. B. Ferris of the South Mississippi Experiment Station reports that poisoning when 10% of the squares were punctured proved very profitable at that station this year. Three applications of calcium arsenate were made—July 18, 22 and 27. The unpoisoned check acre produced 1264 pounds of seed cotton, while the poisoned acre yielded 1525 pounds, an increase of 261 pounds due to poisoning. The difference would doubtless have been much greater with more rainfall.

The only reliable method of deciding whether cotton needs poisoning or not is by making infestation counts, and the grower who either poisons or does not poison without using this method as the basis for his decision, is risking a serious loss. He should watch his cotton carefully enough to know when 10% of the squares are punctured, then apply the poison without delay. If a long drouth follows immediately, the poisoning may not pay. But who wants to gamble on the weather when calcium arsenate is selling from 7 to 10 cents a pound?

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### TREATING SEED IRISH POTATOES PAYS

With the cooperation of the Raymond Branch Experiment Station, a test was made this year by H. H. Wedgworth, Inspector of the State Plant Board, to learn the effect under Mississippi conditions of treating Irish potato seed for 30 minutes in a corrosive sublimate solution for the control of common potato scab. This test is described in Mississippi Experiment Station Circular 61, "Seed Treatment for the Control of Irish Potato Scab," and may be secured from the Agricultural Experiment Station, A. & M. College, Miss.



FIG. 5.—Potato showing typical scab spots with fruiting bodies of the organism causing the disease. (Miss. Exp. Sta.)

The solution used was made according to the regular formula—1 to 1000, or one ounce of corrosive sublimate (bichloride of mercury) to 8 gallons of water. Seed free of scab spots, and also slightly scabby seed were treated on separate plats, with a check plat for each. The results shown in the table below are averages of three plats in each case:

Kind and Treatment of Seed	Clean per cent	Scabby			Yield of Market- able Size Tubers	Yield of Culls
		Slight	Moder- ate	Severe		
	per cent	per cent	per cent	per cent	bu per acre	bu per acre
Seed free of Scab Spots—Treated 30 minutes	96.55	3.45	0	0	167.45	10.61
Seed free of Scab Spots—Untreated	23.17	74.92	29.37	13.41	163.71	13.17
Seed Slightly Scab- bed—Treated 30 minutes	93.06	6.94	0	0	162.15	7.80
Seed Slightly Scab- bed—untreated	12.35	87.05	32.12	19.48	162.51	12.89

While the treatment apparently had little or no effect on the total yield per acre, the fact that the treated seed yielded from 93% to 96% of clean potatoes in comparison with 12% to 23% clean potatoes from the untreated seed should prove to any farmer or truck grower who takes pride in securing fancy prices for quality products that the

corrosive sublimate treatment for seed Irish potatoes will pay well.

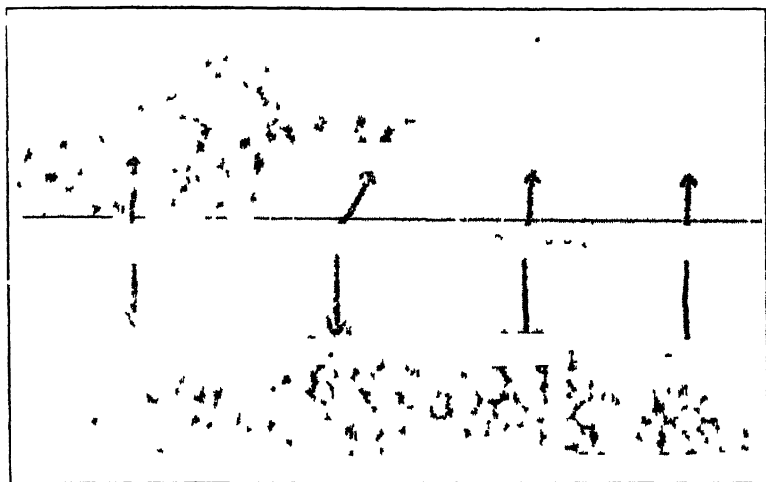


FIG. 6.—Upper—classes of tubers from seed treated with corrosive sublimate solution.

Lower—Classes of tubers from untreated seed. (Miss. Exp. St.)

## MISSISSIPPI BEEKEEPERS HAVE GOOD YEAR

By Clay Lyle

Reports from beekeepers in various sections of Mississippi indicate that for the State as a whole the past season has been one of the best in several years. Queen breeders and package shippers report splendid business, followed by exceptionally good honey yields. And in sections devoted wholly to honey production, the yields have been better than the average in most cases. Extra heavy flows from bitterweed in some localities and from heartsease in others have fixed the colonies in fine condition for the winter.

In the Delta section, yields of 200 to 300 pounds are being reported. One progressive beekeeper reports 372 pounds from his best colony, 336 pounds from a daughter colony, but an average of only 113 pounds from his 85 colonies. A leading beekeeper near Natchez, whose best colonies

last year produced 310 pounds each, reports a marked decrease this year. However, another beekeeper of that section reports a few colonies with more than 200 pounds.

Beekeepers in the Northeast Prairie or sweet clover section have fared better than those in other parts of the State this season. The queen breeders and package shippers pulled their colonies to the limit in supplying the demand in the spring, and the best they expected at the time was for their colonies to build up enough to pass through the winter. However, the sweet clover flow was unusually good, and supers were soon stacking up on colonies that had a slim chance of survival a few weeks before. One extensive package shipper with 540 colonies, made up nearly 300 colonies increase in July, but in spite of this, reports an average yield of nearly 150 pounds comb honey from colonies that were packaged before May 10, and 100 pounds per colony from those pulled after that date. Other package shippers in this section report yields almost as good.

A student at the A. & M. College, returning to his home in the prairie section in June after the close of the college year, found that all his colonies had swarmed. In spite of this however, he secured an average yield of more than 100 pounds of comb honey per colony. The best colony in the experimental apiary of Prof. R. N. Lobdell, at the Mississippi A. & M. College, produced over 200 pounds from spring flows, chiefly sweet clover, and then stored 175 pounds of fall honey, most of which was from bitterweed, or a total of more than 375 pounds. This is an unusual flow from bitterweed for this section.

There is no doubt that the progressive beekeepers of Mississippi are more optimistic than at any time in recent years. Yields have been good, colonies are in fine shape for the winter, American foulbrood is known only in one county and is almost eradicated, while a state law protects them from further foulbrood infections by imposing a heavy penalty of fine and imprisonment on the itinerant beekeeper who comes into the State with uncertified bees. So there are good reasons for optimism.

## 2910 ACRES SWEET POTATOES PASS INSPECTION

### Chickasaw County Leads in Acreage and Growers

More than 2900 acres of sweet potatoes in Mississippi have passed the field inspection for stem rot, or nearly 100% increase over the acreage of 1924. If the storage inspections for black rot prove satisfactory, the amount of certified seed potatoes available for planting will be almost double that of last year. In 1924, only 1500 acres passed the field inspections. This increase is not due to any modification of the requirements of the State Plant Board for certification, but represents the growing interest of the farmers of the State in certified seed potato production.

This certified acreage was produced on 1215 farms, well distributed over the State, though there are a few counties without a single certified grower. The total acreage inspected by the State Plant Board this season was 3040, on 1297 farms, but the fields on 82 farms, totaling 130 acres failed to pass the inspections and were condemned for seed purposes, leaving 2910 acres eligible for certification if the storage inspections are satisfactory.

The county which headed the list in 1924—Chickasaw—with 50 growers and 175 acres, is again at the top this year, but with 78 growers and 270 acres. Tippah County is second in acreage with 38 growers and 187 acres. Alcorn, Calhoun, Lauderdale, Lee, and Pontotoc counties also get in the class with 100 acres or more.

The growth of the certified seed sweet potato and potato plant business in Mississippi during the past five years has been almost phenomenal. Very few of the most extensive growers in Mississippi today were engaged in the business at all in 1920. So many precautions are taken to prevent disease under the strict regulations of the State Plant Board that the buyer of Mississippi certified seed potatoes and potato plants is assured of getting a product of the highest quality on the market.

**BEAN ANTHRACNOSE SERIOUS****Plant Board Will Test Seed Samples for Disease**

Bean anthracnose has caused heavy losses on fall snap beans in the southwestern part of the State, according to reports from Centerville and Woodville. This is a rather unusual condition, as late summer and fall beans are usually free from the disease, which does little damage in hot, dry weather. The rainy spell which prevailed over the entire State in October is largely responsible for the severity of the attack at this time. In many years, this disease causes considerable loss in all sections of the State.

Anthracnose attacks all parts of the bean plant. The leaves appear blighted and large black spots or cankers appear on the pods, often shrivelling them and preventing development. The diseased seed also have small black or brown spots on them.

In planning for next season, growers are advised by the Plant Board to secure disease-free seed if possible, as this is the best preventive measure known. Care should also be used to prevent spreading the disease in the field. Cultivating or picking should not be done while the plants are wet with dew or rain, and when pods are packed for shipping or hauling to a canning plant, all spotted pods should be discarded, as the disease spreads rapidly under such conditions. Certain varieties of beans are resistant to this disease, but none of them is of the snap or stringless type.

Since a grower risks a heavy loss by planting diseased seed he should send samples of the seed he expects to use to the State Plant Board and have them tested to see if anthracnose is present. There is no charge for this service and it may save the bean grower a good many dollars. Send all samples of beans to be tested to the State Plant Board, A. & M. College, Miss.

**GOOD RESULTS FROM WILT-RESISTANT TOMATOES**

In spite of the extremely dry weather in most sections of Mississippi during the past season, reports from many people over the State indicate that the wilt-resistant tomato seed planted in more than 10,000 home gardens last spring have given excellent results. In a few cases, the plants apparently died from drouth, but most of the letters report good yields. A few expressions are quoted below:

"I wish to express my thanks for the wilt-resistant tomato seed. But for this variety, I would not have any tomatoes now (Sept. 21), as all my plants of a commercial variety died long ago. I have saved seed for another year and will divide all I can with my neighbors."

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"I am very glad indeed to advise you that the tomatoes gave the best of results. They did not blight, made a fine healthy fruit of good size, and, in fact, grew on some land that I have never before been able to raise tomatoes on."

"I have saved my seed for another year. They were fine tomatoes—all that I could expect from them. I don't think I will use any other kind as long as I can keep the seed."

On account of the extreme drouth in some sections, it is apparent that many people were unable to save seed for themselves and their neighbors, and for this reason the State Plant Board and Experiment Station will again cooperate in supplying wilt-resistant seed free of charge to all citizens of Mississippi who are troubled with wilt. The varieties offered for 1926 are Louisiana Red, Louisiana Pink, Norton Red, Norton Pink, Marvel, Red Marglobe, and Pink Marglobe. They were grown principally at the Raymond Branch Experiment Station, though some were also produced at the South Mississippi Branch Experiment Station at Poplarville. All requests for wilt-resistant seed should be mailed (in January, preferably) to the State Plant Board, A. & M. College, Miss.



### SAVE THE CORN

Nearly all the corn has been harvested by this time and there should be no delay in fumigating it to prevent weevil damage. The same applies to peas and beans. The greatest drawback to weevil control in Mississippi is the lack of tight cribs for fumigation. Most cribs can be made tight enough at very little expense. In fact, the value of the corn saved in one year will be more than enough to pay the extra expense of making the crib tight enough for fumigation. The actual cost of fumigating in a tight crib is very little, and is only about one-half as much for shucked corn as for ears with the shuck on, since the unshucked corn occupies nearly twice as much space as the shucked.

With carbon bisulphide at 20 cents a pound, which is as much as it should cost anyone buying in quantities, the estimated cost of fumigating shucked corn twice is only one-third of a cent per bushel. Carbon bisulphide should be purchased cooperatively in not less than 100-pound drums, as the price is much lower for large quantities. Mississippi farmers will find some valuable recommendations for weevil control in the following bulletins which may be secured from the State Plant Board, or from the Department of Agriculture, Washington, D. C.; Farmers' Bulletin 799, "Carbon Disulphid as an Insecticide"; Farmers' Bulletin 915, "How to Reduce Weevil Waste in Southern Corn"; and Farmer's Bulletin 1029, "Conserving Corn From Weevils in Gulf Coast States."

## NEW RECORD FOR ANT CAMPAIGNS

The Argentine ants in Mississippi are about to face a hard winter, as more towns are cooperating this fall in campaigns to poison these pests than ever before. Though 18 towns put out poison last year, all past records have been overwhelmingly eclipsed this season, as 32 towns have already put out poison and campaigns are practically assured in at least 7 additional towns, making a total of 39. It is probable that still more will be added to this list later.

Ant campaigns are now in progress, or have already been completed, at the following places: A. & M. College, Ansley, Bay St. Louis, Belzoni, Cary, Clarksdale, Columbus, Corinth, Durant, Ellisville, Gainesville-Napoleon-Nezan area, Goodman, Greenville, Itta Bena, Kiln, Magnolia, Mayhew, National Cemetery at Vicksburg, Nicholson Avenue, Ocean Springs, Orrisburg, Oxford, Pascagoula, Pearlinton, Pelahatchie, Picayune, Quitman, Ridgeland, Stafford Springs, Starkville, Summit, and West Point.

The Argentine ant is known to occur at 104 places in Mississippi, and the fact that more than one-third of these towns are already enlisted in a determined fight against these pests indicates a high degree of civic pride and a splendid spirit of cooperation among their citizens. The success of these campaigns is practically assured, as most excellent results have been secured in all cases during the past two years. Other infested towns are urged to start fighting the ants without delay. For any information about an Argentine ant control campaign, address the Entomologist, State Plant Board, A. & M. College, Miss.

# LIST OF KNOWN ARGENTINE ANT INFESTATIONS IN MISSISSIPPI, NOVEMBER 1, 1925.

A. & M. College	Gainesville-Napoleon-Nezan
Aberdeen	(Hancock County)
Ackerman	Goodman
Amory	Greenville
Ansley (Hancock County)	Greenwood
Bay St. Louis	Gulfport
Beatty (Carroll County )	Hamburg
Belzoni	Hamilton
Benton (Yazoo County )	Handsboro
Bentonia (Yazoo County)	Hattiesburg
Biloxi	Hazlehurst
Booneville	Hoffman (Holmes County)
Brookhaven	Houston
Canton	Itta Bena
Cary (Sharkey County)	Jackson
Centreville	Johnston's Station (Pike
Chatawa (Pike County)	County)
Clarksdale	Kiln
Clinton	Kosciusko
Collins	Kuykendall's Farm (Attala
Columbia	County)
Columbus	Landon
Corinth	Laurel
Crystal Springs	Lexington
Durant	Lyman
Ellisville	Macon
Eupora	Madison
*Fayette	Magnolia
Fernwood	Mayhew
Florence	McAdams
Fort Adams	McCool
Flora	McComb
Gallman	Meridian

\*The Argentine ant has apparently been eradicated in Fayette.

# STATE PLANT BOARD OF MISSISSIPPI

Mississippi City	Sallis
Mize	Shaw
Morton	Silver Creek
National Park (Vicksburg)	Smithville
New Augusta	Stafford Springs (Jasper County)
Nicholson Avenue (Han- cock County)	Starkville
Norfield (Lincoln County)	Sturgis
Ocean Springs	Summit
Orvisburg (Pearl River County)	Terry
Osyka	Tillatoba
Oxford	Tylertown
Pascagoula	Vicksburg
Pass Christian	Vosburg
Pearlington	Water Valley
Pelahatchie	Wesson
Picayune	West
Prentiss	West Point
Purvis	Williamsville (Attala Coun- ty)
Quitman	Winona
Ridgeland	Woodville
Rodney	Yazoo City
Total	-----104

## TO SCHOOLS AND COMMUNITY CLUBS

With the purpose of rendering more and more service to a constantly increasing number of people, the State Plant Board has prepared an illustrated lecture to be shown in schools and at community club meetings wherever it may be desired. This lecture consists of an excellent series of lantern slides of the most important insect pests and plant diseases of interest to Mississippi, and is presented by an inspector who explains the slides and answers any questions that may be asked. There is no charge for this lecture and it may be given anywhere an interested crowd can be gathered. It may be shown at schools without electric lights, as a Ford battery furnishes ample current for the machine.

Among the subjects shown and discussed are the following: boll weevil, Argentine ant, sweet potato weevil, San Jose scale, peach tree borer, curculio, tomato fruitworm, cotton worm, cucumber beetles, cutworms, grasshoppers, plant lice, corn weevils, pickle worm, chinch bug, webworms, pink bollworm, Japanese beetle, European corn borer, Mexican bean beetle, gypsy moth, brown-tail moth, crown gall of fruit trees, buying fruit trees, tomato wilt, watermelon insects and diseases, bee diseases, sweet potato diseases, Irish potato diseases, value of certified Irish potato seed, various garden pests, beneficial insects, and many other topics.

Any school principal, agriculturist, county agent, or community club leader who would like to have this lecture given should write the State Plant Board, A. & M. College, Miss., and arrange for a date.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

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Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

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Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
D. C. NEAL, Plant Pathologist ..... Associate Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

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Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

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## MISSISSIPPI SHOULD ERADICATE THE ARGENTINE ANT.

There was a time when the most intelligent people did not believe that it was possible to eradicate an insect pest or plant disease. Many ridiculed the use of the word eradicate and insisted that the best that could be hoped for was the control of any pest. Wonderful progress has been made during the past 15 or 20 years and we now know that many pests have apparently been completely eradicated from large areas.

For generations the people of Mississippi lived in constant dread of the terrible disease known as Yellow Fever.

It has now been twenty years since the last outbreak of this disease occurred in Mississippi, and there is every reason to believe that never again will this dreaded disease appear in Mississippi simply because it has been almost eradicated from all parts of the world where it formerly occurred.

Twenty years ago scarcely a cow could be found in Mississippi that did not have ticks. Now there are tens of thousands of grown men and women in the state who see cattle every day who have never seen a cattle tick. The ticks have absolutely been eradicated from more than two-thirds of the state. More than fifty counties have been free of ticks for several years.

Ten years ago citrus canker threatened to destroy the citrus industry along the Gulf Coast of Mississippi. Thousands of plants were burned because of this disease. Now three years have passed without a single plant being found infected with this disease. It has apparently been eradicated from Mississippi.

The eradication of the pink bollworm of cotton in recent years from large areas in Louisiana and Texas is well known to all interested in the cotton industry. It has probably saved the South from a pest as serious as the boll weevil.

Numerous other cases might be cited to show that eradication of a pest is both possible and practical. Mississippi is now threatened with a pest that will cause enormous loss and great annoyance in the future if it is not eradicated. We know that it is possible and practical to eradicate the Argentine ant. If it is not eradicated we know that in time every property and every house, barn, store, and other building in Mississippi will be infested. We know that if the Argentine ant is allowed to go unchecked until it reaches every corner of the state, it will cause directly and indirectly a loss that will amount to millions of dollars annually.

The only practical, sensible, and business-like policy for the State to adopt is to start a campaign to completely eradicate the Argentine ant from Mississippi. There are still 31 counties in Mississippi that are apparently not yet infested by the Argentine ant. Why wait to let these counties become infested? There is not yet a county in Mississippi that is one-half infested by these ants. Why postpone the fight until larger areas are infested and the cost of eradicating them has increased many times?

Mississippi has an opportunity now that she will not have ten or twenty years from now. A rather careful survey of the situation throughout the state indicates that by the expenditure of \$100,000.00 per year by the state a real campaign towards complete eradication of the ants could be maintained. There is every reason to believe that many towns, cities, and counties would cooperate, as more than 30 towns are fighting the ants this year and one county has appropriated as much as \$7000.00 to fight the ants for one year.

There is also every reason to believe that the ants may be completely eradicated from some places within four or five years and greatly reduced in all places so that the annual appropriation could be gradually reduced after four or five years. If we can once eradicate the ants from the state, there is every reason to believe that the Plant Board organization can keep the ants out.

If the Argentine ant is not eradicated, it will be here always. Our children's children a thousand years from now will have to fight this pest every day and every year simply because we were not farsighted enough to eradicate it when we had the opportunity. Let every intelligent Mississippian who loves his state and is thinking of her future welfare get behind this fight to completely eradicate the Argentine ant from Mississippi. It will take money to do this and it will take an annual appropriation of \$100,000.00 for several years if we are to make any real progress in our fight against this pest.



## APIARY INSPECTION REPORT

For Quarter Ending September 30, 1925.

County	Frame Hives	Box Hives	European Foulbrood	American Foulbrood
Adams -----	269	----	----	----
Alcorn -----	310	11	----	----
Amite -----	31	----	----	----
Claiborne -----	105	----	----	----
Coahoma -----	5	1	----	----
Pike -----	4	28	----	----
Warren -----	46	----	----	----
Washington -----	399	----	10	29
Total -----	1169	40	10	*29

\*Burned or shaken carefully.

## REPORT OF NURSERY INSPECTOR

For Quarter Ending September 30, 1925

Number of nurseries inspected -----		137
Acreage in nurseries inspected -----		533
Amount of nursery stock inspected:		
Grafted and budded pecan ----	711,307	
Seedling pecan -----	544,465	
Total pecan -----		1,255,772
Walnut -----	125	
Total walnut -----		125
Citrus trifoliata -----	1,027,539	
Orange -----	317,294	
Grapefruit -----	11,872	
Kumquat -----	4,680	
Lemon -----	7,314	
Total citrus -----		1,368,699
Apple -----	17,605	
Pear -----	93,074	
Peach -----	27,901	
Fig -----	11,530	
Grape -----	8,495	
Plum -----	3,614	
Quince -----	1,570	
Japanese persimmon -----	9,150	
Seedling persimmon -----	1,000	
Strawberry -----	135,500	
Blueberry -----	10,000	
Miscellaneous fruit -----	3,042	
Total fruit (citrus excluded) --		322,481
Kudzu -----	800	
Total kudzu -----		800
Rose -----	19,681	
Miscellaneous ornamental -----	416,145	
Total ornamental -----		435,826
Grand total of plants inspected		
during quarter -----		3,383,703

## QUARANTINE INSPECTION REPORT

For Period from July 1 to September 30, 1925

## Ships and vessels inspected:

From foreign ports -----	10
From U. S. ports -----	0
Total -----	10

## Parcels inspected:

## Arriving by land, express, freight, wagon, etc:

Passed -----	41
Treated and passed -----	0
Returned to shipper -----	0
Contraband destroyed -----	1
Total -----	42

## Arriving by mail:

Passed -----	101
Treated and passed -----	0
Returned to shipper -----	0
Contraband destroyed -----	1
Total -----	102

Grand total of parcels inspected ----- 144

Total parcels passed -----	142
Total parcels treated and passed -----	0
Total parcels returned to shipper -----	0
Contraband destroyed -----	2
Grand total -----	144

1926

# THE QUARTERLY BULLETIN

— OF THE —

# STATE PLANT BOARD

OF MISSISSIPPI

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VOL. 5

JANUARY, 1926

No. 4

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PUBLISHED BY  
STATE PLANT BOARD OF MISSISSIPPI  
A. & M. COLLEGE, MISSISSIPPI

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Entered as second-class matter July 9, 1921, at the post office at  
A. & M. College, Mississippi, under the Act of June 6, 1900.

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# The Pink Bollworm Situation In Texas

As the State Plant Board desires to keep Mississippi farmers informed in regard to the pink bollworm situation, the following statement of developments in Texas during 1925 has been summarized from letters received from Mr. R. E. McDonald, Chief Entomologist of the Texas Department of Agriculture:

There was a general increase in pink bollworm damage in the western irrigated sections of Texas in 1925, the damage amounting to 25% at many points, despite the fact that the cotton fields in some of these areas were well cleaned in the fall of 1924. Without these clean-up measures the loss would probably have been much greater. These sections of Texas, which are normally very dry, had much more rainfall in 1925 than usual, which may have had some relation to the increased damage. If this supposition is true, it indicates that the pink bollworm would be a much worse pest in Mississippi and other southern states than in the dry western sections where it now occurs.

A new habit of the pink bollworm was recently discovered by Tom O'Neill, former inspector of the State Plant Board, located at Raymond, Mississippi, but now in Presidio County, Texas. He found large numbers of the bollworms hibernating in cocoons on the ground, successfully withstanding freezes, snows, thaws, and other unfavorable conditions. Until this discovery was made, it was thought that practically all the worms passed the winter in the seed or bolls. This complicates the problem of cleaning up the infested areas, and may explain to a certain extent the heavy infestations that have occurred in fields that were carefully cleaned up the year before.

At a large number of points heavy infestations occurred in fields where the nearest cotton planted the year before had been 25, 30, or 40 miles distant. In practically

every case there was the possibility that these infestations had been started from infested seed hauled by these points. But since all these seed had been sterilized during ginning, it hardly seems probable that enough worms would have escaped to start so many new infestations.

Another possible explanation is in the wind currents which blow from the infested parts of Mexico to this section of Texas. It seems plausible that the pink bollworm moths might drift long distances on these strong winds, since no infestations have been found in those areas of Texas along the Rio Grande River that receive only light winds from the Laguna Valley of Mexico, which is heavily infested. Furthermore, the pink bollworm has not been found at any points where it would have had to fly from infested areas directly against the wind or at right angles to the wind.

Many plans for checking the spread of the pink bollworm are being considered, but the one which seems to most effectively safeguard the South from this pest is a non-cotton zone, 300 to 500 miles wide, starting 5 miles east of the Rio Grande River and extending to the western limits of dry farming. This plan will be submitted to the Pink Bollworm Commission of Texas during 1926 with a view to putting it into operation next year. In the meantime, regulated zones will be created, restricting the movement of cotton products therefrom.

Precautions taken during 1925 to prevent the pink bollworm from moving out of the infested areas were as follows: All seed were sterilized at the gins and crushed within the quarantined district, or returned to the farms for planting. All lint was vacuum fumigated. No hulls were allowed to be moved out of the district. All samples were fumigated, and all minor and less dangerous products such as meal and cake moved under the strictest regulations. Road inspection stations were maintained to prevent the carriage of material over the highways.

In Mississippi, the State Plant Board has maintained strict quarantines against cotton seed, seed cotton, and cottonseed hulls from Texas, New Mexico, Oklahoma, and Western Louisiana for the past six years. Besides this

protection, cotton fields in every county in the State, as well as gins and oil mills, have been examined for the pink bollworm, and citizens all over the State have been warned against the pest and urged to send to the State Plant Board any suspicious-looking worms found in seed or bolls. All these precautions will be continued and every effort will be made to keep this pest out of Mississippi just as long as possible.

### NEW BULLETIN ON TOMATO FRUITWORM

Hundreds of tomato growers in Mississippi will be interested in a new bulletin just issued by the Tennessee Experiment Station, "The Corn Earworm on Tomato," by S. Marcovitch and S. A. Robert, which apparently explodes an old theory about controlling this pest. For many years entomologists in various parts of the United States have recommended the planting of trap crops of early corn to protect tomatoes from the corn earworm or tomato fruitworm, *Heliothis obsoleta*, but the Tennessee experiments show that this advice is all wrong, as the trap crops not only failed to keep the worms off the tomatoes, but actually increased the damage.

In the spring of 1923, fifteen rows of tomatoes, containing 20 hills to the row, were planted together, with 3 adjacent parallel rows of corn on each side. When examined on June 23, a count revealed an average of 6 wormy tomatoes to the row, while the sprayed plat had an average of  $1\frac{1}{2}$  per row, and the check plat had 9 per row.

In 1924 and 1925 more extensive experiments were conducted, ranging from a hill of corn alternating with a hill of tomatoes, to one row of corn for every 8 rows of tomatoes. The results secured were even more unfavorable to the trap crop than those of 1923. Where corn alternated with tomatoes within the row there were 66 wormy tomatoes to the row, and where corn rows alternated with tomato rows there were 67 wormy fruits per row. In comparison with this, the sprayed plats had an average of 5.8 wormy tomatoes per row, while the check plat averaged 19 per row.



For the sprayed plats, powdered lead arsenate was used at the rate of  $1\frac{1}{2}$  pounds to 50 gallons of water, plus 2 pounds of hydrated lime, or  $1\frac{1}{2}$  pound Kay-o, to act as a spreader and sticker. From two to four applications were made at intervals of 12 to 14 days, starting soon after the fruit began to set. If dusting is preferred, calcium arsenate is recommended at the rate of 10 pounds per acre.

Truck growers who are especially interested in this subject should write the Agricultural Experiment Station, Knoxville, Tennessee, for Bulletin 133, "The Corn Earworm on Tomato."

Good results in spraying and dusting to control the corn earworm on tomatoes were secured by R. C. Price, former inspector of the State Plant Board at the Poplarville Branch Experiment Station, in 1923. Tomatoes dusted with undiluted calcium arsenate on June 5, 14, and 30, had only 2.43% of wormy fruits; those sprayed with lead arsenate June 2, 14, and 30 had only 1.5% wormy fruits; while the untreated check plat was 11.5% wormy. This experiment was described in the April, 1924, issue of the Quarterly Bulletin of the State Plant Board.

### CONTROLLING CUTWORMS ON TRUCK CROPS

Cutworms destroyed about 15% of the tomato plant in the Crystal Springs trucking section in the spring of 1925, and in many fields where no control measures were used losses of 75% to 90% occurred. In one case, a grower used over 14,000 plants in attempting to secure a stand of plants on one acre that required about 5,000 plants to give a perfect stand. That these losses could have been prevented almost entirely is shown in Mississippi Experiment Station Circular 62, "Poisoned Bait for the Control of Cutworms," by H. H. Wedgeworth, Inspector of the State Plant Board, located at the Raymond Branch Experiment Station.

The poisoned bait used in the experiments described in this circular was made according to the following formula:

Wheat Shorts -----5 lbs. Molasses -----  $1\frac{1}{2}$  pint  
Paris Green -----1 $\frac{1}{2}$  ozs. Water----- 1 gal.

The shorts and Paris Green were thoroughly mixed while dry and then wet with the mixture of molasses and water until damp enough to be of such consistency that it would fall in small lumps, about the size of oat grains, when scattered.

The value of the poisoned bait was tested on land free of vegetation, in cages where cutworms were confined with growing tomato plants, and on rows in the field. The almost perfect control secured by using the poisoned bait is shown in the following summary quoted from the circular:

“(1) In an experiment with cages free of vegetation, 88% of the cutworms were killed where poisoned bait was applied broadcast and 9% died in the checks (probably from injuries in handling.)

“(2) In a cage experiment where young tomato plants were growing, only 7% of the plants were cut in the poisoned cages compared with 96.88% cut in the check cages.

“(3) In a simple field test, poisoned bait was applied in small quantities near each plant and one row was left as a check. Less than 1-10 of one percent of the plants were cut on the treated rows compared with 23.65% in the check.”

With such splendid results from using the poisoned bait, no truck grower should fail to protect his crop this spring. As soon as the land is prepared for the tomato plants or other plants, the poisoned bait should be scattered over the field, applying it late in the afternoon, and if possible several days before the plants are set. If the cutworms are very numerous the application may be repeated when the plants are set, or just before setting. Using the formula given above, 20 pounds of wheat shorts will make enough bait to poison about three acres. Poisoned bait around the edges of the fields will also destroy large numbers of cutworms crawling from surrounding grass or ditch banks. A copy of this circular may be secured by writing the Mississippi Experiment Station, A. & M. College, Miss.

# THE QUARTERLY BULLETIN

STATE PLANT BOARD OF MISSISSIPPI

Devoted especially to the prevention, eradication, and control of insect pests and plant diseases affecting the agricultural and horticultural interests of Mississippi.

Sent free to all citizens of Mississippi on request. Offered in exchange for publications of the Federal and foreign governments and experiment stations, entomological and mycological journals, agricultural and horticultural papers, and other publications of a similar nature.

R. W. HARNED, Entomologist.....Editor  
HUNTER H. KIMBALL.....Associate Editor  
CLAY LYLE.....Managing Editor

Entered as second-class matter July 9, 1921, at the post office at A. & M. College, Mississippi, under the Act of June 6, 1900.

## NURSERY INSPECTION REPORT

(For Period October 1 —December 31, 1925)

Number of nurseries inspected during quarter.....137  
Acreage in nurseries inspected ..... 475

### AMOUNT OF NURSERY STOCK INSPECTED:

Grafted and budded pecan.....	200,929	
Seedling pecan .....	179,520	
Total pecan .....		380,449
Citrus trifoliata .....	344,166	
Orange .....	210,248	
Grapefruit .....	1,121	
Kumquat .....	1,905	
Lemon .....	411	
Miscellaneous citrus .....	804	
Total citrus .....		558,658

Apple .....	6,657	
Pear .....	62,563	
Peach .....	35,350	
Fig .....	1,285	
Grape .....	3,650	
Plum .....	3,564	
Persimmon .....	3,400	
Quince .....	320	
Strawberry .....	2,195,500	
Blackberry .....	1,000	
Total fruit (citrus excluded)		2,313,289
Rose .....	85,786	
Miscellaneous ornamental .....	739,104	
Total ornamental .....		824,890
Grand total of plants inspected during quarter .....		4,077,286

### QUARANTINE INSPECTION REPORT

For Period October 1—December 31, 1925

#### Ships and vessels inspected:

From foreign ports .....	5
From U. S. ports .....	0

#### Parcels inspected:

##### Arriving by land: express, freight, wagon, etc.

Passed .....	1,395
Treated and passed .....	0
Returned to shipper .....	3
Contraband destroyed .....	27
Total .....	1,425

##### Arriving by mail:

Passed .....	403
Treated and passed .....	4
Returned to shipper .....	10
Contraband destroyed .....	12
Total .....	429

Grand total parcels inspected..... 1,854

Total parcels passed .....

Total parcels treated and passed .....

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# QUARTERLY BULLETIN FOR JANUARY, 1926

Total parcels returned to shipper -----	13
Contraband destroyed -----	39
Grand total -----	1,854

## CITRUS CANCKER SCOUTING REPORT

For the Period April 1, 1925 to December 31, 1925

Number of counties in the state which have at one time or another since 1916 shown canker...	4
Number of counties showing canker April 1, 1925 to December 31, 1925 -----	0
Number of grove trees inspected April 1, 1925 to December 31, 1925 -----	38,027
Number of nursery trees inspected April 1, 1925 to December 31, 1925 -----	905,839
Number C. trifoliata inspected April 1, 1925 to December 31, 1925 -----	933,185
Total number of grove trees found infected June 1, 1916 to December 31, 1925 -----	3,117
Total number of nursery trees found infected June 1, 1916, to December 31, 1925 -----	51,167
Number of properties infected during 1916 -----	108
Number of properties infected during 1917 -----	47
Number of properties infected during 1918 -----	14
Number of properties infected during 1919 -----	4
Number of properties infected during 1920 -----	0
Number of properties infected during 1921 -----	1
Number of properties infected during 1922 -----	8
Number of properties infected during 1923, 1924 and 1925 -----	0
Number of new properties infected during 1917 --	12
Number of new properties infected during 1918 --	1
Number of new properties infected during 1919 and 1920 -----	0
Number of new properties infected during 1921 --	1
Number of new properties infected during 1922 --	8
Number of new properties infected during 1923, 1924 and 1925 -----	0
Total number of properties found infected June 1, 1916 to December 31, 1925 -----	130
Total number of properties declared no longer danger centers -----	130

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## FOR

# THE QUARTERLY BULLETIN

## OF THE

## State Plant Board of Mississippi

A. & M. COLLEGE, MISS.

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## STAFF

(In active service December 31, 1925)

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NOTE—Where no address is given above, headquarters are at  
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\*In co-operation with the United States Department of Agriculture.

